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VOLUME 26 JANUARY 25, 1937 NUMBER 2

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VOLUME 26 | JANUARY 25, 1937 | NUMBER 2

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Official Publication of the American Association of Textile Chemists and Colorists

THE OBJECTS OF THIS ASSOCIATION ARE:

"To promote increase of knowledge of the application of dyes and chemicals in the Textile Industry.

"To encourage in any practicable ways research work on chemical processes and materials of importance to the Textile Industry.

"To establish for the members channels by which the interchange of professional knowledge among them may be increased."

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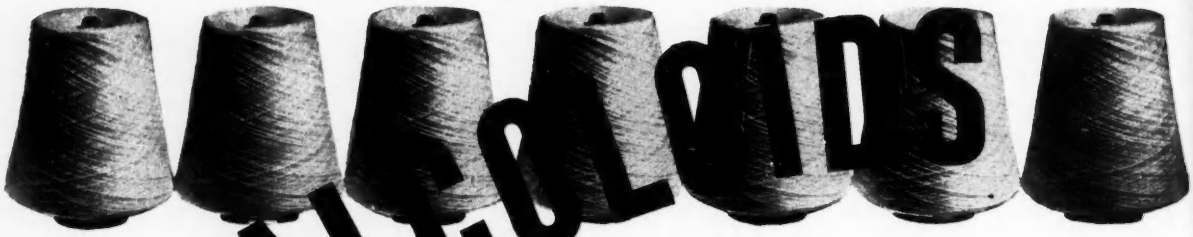

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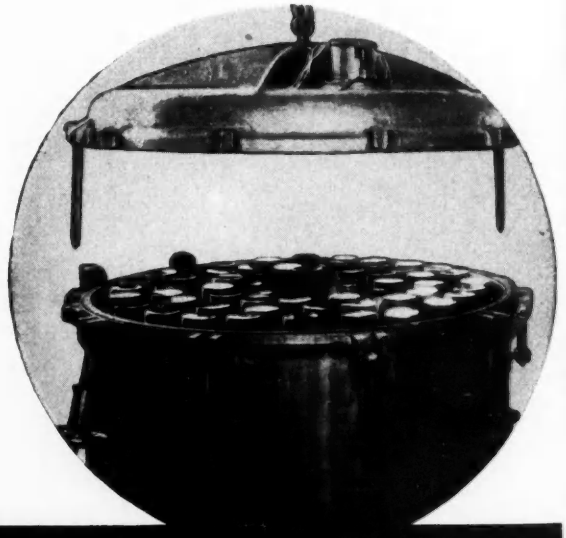

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AMERICAN
DYESTUFF REPORTER

VOLUME 26 JANUARY 25, 1937 NUMBER 2

The Steam Accumulator

in Dyeing Plants

C. H. S. TUPHOLME

ONE of the problems in a dyehouse power plant is an economical means of meeting the widely varying load on the steam generating plant, while at the same time building up a reserve of thermal energy which is instantly available when required, either in the form of power and heat.

The obvious way to do this is to store the surplus steam generated during periods of low load which can be drawn upon at times of high demand. This is the function of the steam accumulator which enables the steam-raising plant to operate at continuous rating corresponding to the average demand on the entire power plant, thus not only securing more efficient service for the processing departments, but also reducing to a minimum the wear and tear on steam-raising equipment which is inseparable from widely fluctuating steam demand.

Apart from this, the steam accumulator maintains a constant pressure both on the high-pressure and low-pressure steam mains between which it is connected, thus ensuring a supply of steam to the processing plant at an absolutely constant pressure and temperature—an extremely useful function in all industrial operations, particularly those employing delicate chemical and physical processes, such as in the dyeing and associated industries.

The use of high-pressure boilers with back-pressure turbines represents an ideal combination from the thermal efficiency point of view. The disadvantage of such a system is, however, that the proportion of steam required for power and for process varies considerably, while all the difficulties of the industrial steam plant are accentuated by the restricted water capacity of the high-pressure boiler. If, however, a steam accumulator is installed between the turbine and the process plant, this supplies the necessary thermal storage capacity to take care of any difference in demand between power and process. By-product power obtained in this manner costs only about 25 per cent. of that generated in condensing turbines—a fact of vital importance in the dyeing industries.

Various types of steam accumulators have been designed, but the Ruths has so far proved to be the most popular in the European textile industries. This accumulator is built in the form of a cylindrical shell with hemispherical ends. Its volume is so large in comparison with its exterior surface that an insulation of 3 to 4 in. in thickness is sufficient to reduce the heat loss to a negligible quantity, even if it is installed in the open air without building protection, as is usual. In point of fact, the radiation loss is usually less than 0.2 B. t. u. per square foot of exposed surface per hour per degree F. temperature difference, which corresponds, in an average case, to less than the heat equivalent of 8 lb. of coal per hour. The plant consists of two parts: the accumulator proper, and the automatic valves which ensure the co-operation of the boilers and the accumulator and govern the steam distribution throughout the works.

The accumulator is based on the principle of storing the heat energy of steam in a large quantity of water under pressure and at saturation temperature, and releasing this energy in the form of steam produced by ebullition under a reduction in pressure. With an initial pressure of 300 lb. per sq. inch and a temperature equal to the saturation temperature corresponding to that pressure, a drop in pressure of 50 lbs. per sq. inch would result in the production of 1.02 lb. of steam for each cubic foot of water. If the initial pressure is 60 lb. per sq. inch, and the final pressure 10 lb. per sq. inch, the amount of steam produced would be 4.24 lb. per cubic foot.

The first condition exemplifies the process of steam production by pressure drop in a high-pressure boiler and the second that in an accumulator designed for an intermediate stage in the process of expansion. In the example chosen, for the same pressure drop of 50 lb. per sq. inch, the storage capacity of the accumulator would be more than four times larger than that of the boiler per cubic foot of water capacity. In addition, the boiler would have to be built to withstand a pressure of 300 lb. per sq. inch, while

the accumulator need only be designed for a pressure of 60 lb. per sq. inch. Steam storage capacity in an accumulator can therefore be obtained much more cheaply than in a boiler. Usually a pressure variation as high as 50 lb. per sq. inch should not be allowed to take place in the boiler, whereas the accumulator is expressly designed for a large pressure drop. The difference between the comparative steam storage capacity of boilers and accumulators is therefore rather more important in practice than the above figures indicate.

The following is a description of an accumulator installation in a textile mill with dye-house. Before installing the accumulator the plant suffered from a shortage of steam and an extension to the boiler house was contemplated. The normal boiler capacity was approximately 35,000 lb. of steam per hour, in addition to which a locomobile boiler of 5,000 lb. of steam per hour was kept in operation. During the morning hours, the heating up of the dye kettles was considerably delayed, due to steam shortage, in spite of the fact that the kettles were preheated for an hour and a half before the beginning of the working day. In this way much valuable time was lost, the operatives being kept waiting until the proper temperature of the water had been reached.

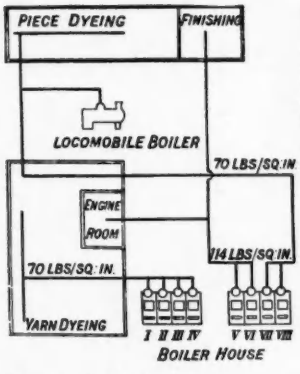

Fig. 1. Original Arrangement of Plant.

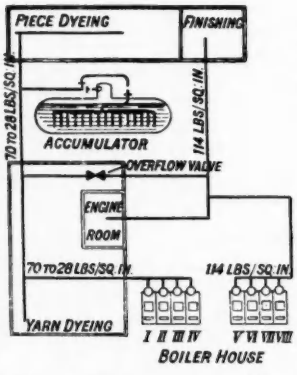

Fig. 2. Arrangement of Plant with Accumulator Installed.

The original arrangement of the steam plant is shown in Fig. 1. After careful investigation it was decided to install a steam accumulator instead of enlarging the boiler-house, and the plant was rearranged as shown in Fig. 2.

When designing the accumulator installation, the steam consumption of the mill throughout a typical working day was measured and found to be as shown by the dotted line in Fig. 3. The fluctuations do not appear to be out of the way, but this was traced to the fact that the boiler plant was unable to cope with the demand, unfulfilled calls made on the steam-raising equipment going unrecorded. From this diagram the size of the accumulator could not be determined; another curve was therefore constructed showing the probable steam demand with the power and manufacturing processes properly co-ordinated. From this curve the size of the accumulator was determined.

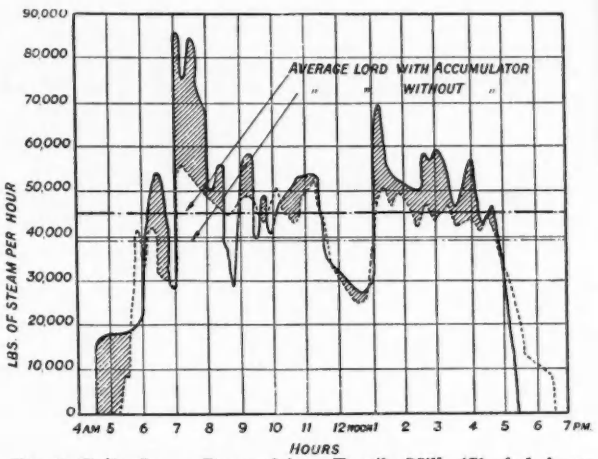

Fig. 3. Daily Steam Demand in a Textile Mill. (Shaded Areas show peak loads taken by Accumulator).

With reference to Fig. 2, boilers V to VIII are operated under a constant pressure of 114 lb. per sq. inch, supplying steam to the engine room and to the finishing plant. The high-pressure main is connected through an overflow valve to the low-pressure steam main, which also receives steam from boilers I to IV. The accumulator is connected to the low-pressure main and has a range of operating pressure from 70 to 28 lb. per sq. inch. The pressure in the low-pressure range and in boilers I to IV adjusts itself to the pressure in the accumulator. With the accumulator installed the locomobile boiler was dispensed with.

In the operation of the plant all boilers are fired at a uniform rate, any excess of steam generated by the high-pressure boilers passing, through the overflow valve, to the low-pressure main. Thence the steam passes either to the dyeing plant or to the accumulator. If the demand on the low-pressure main exceeds the supply of steam from the low-pressure boilers plus the overflow from the high-pressure main, the overflow valve automatically closes and steam is drawn from the accumulator over the pressure range from 70 to 28 lb. per sq. inch, the pressure in the low-pressure boilers being allowed to follow that in the accumulator. If the pressure in the high-pressure main tends to drop, the overflow valve automatically closes and steam is drawn from the accumulator to supply the needs of the dye-house. With the accumulator installed and under the control of the overflow valve, the pressure in the high-pressure main is maintained constant at 114 lb. per sq. inch, so that the steam engines run continuously at constant stop valve pressure, while the finishing department is supplied with steam of constant quality—a point of very considerable importance in this as in most industries.

In this mill, a number of tests were made with and without the accumulator in action. In Fig. 3 the heavy line shows the variation in steam consumption throughout a working day with the accumulator in operation, and the

(Continued on page 50)

PROCEEDINGS OF THE
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JANUARY 25, 1937

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MEETING, LOWELL TEXTILE INSTITUTE, STUDENT SECTION

A MEETING of the Lowell Textile Institute Student Section was held on Thursday, December 17, 1936 at 3:00 P.M. John F. Shea of the Buffalo Electrochemical Co. gave an interesting talk on "Peroxide Bleaching."

Respectfully submitted,
H. FRANCIS CARROLL, *Secretary.*

CALENDAR OF COMING EVENTS

Meeting, New York Section, Swiss Chalet, Rochelle Park, N. J., January 29, 1937.

* * *

Meeting, Rhode Island Section, Jan. 29, 1937.

* * *

Winter Meeting, Piedmont Section, Poinsett Hotel, Greenville, So. Carolina, Jan. 30, 1937.

* * *

Meeting, Philadelphia Section, February 26, 1937, Penn. A.C., Philadelphia, Pa.

Use and Application of

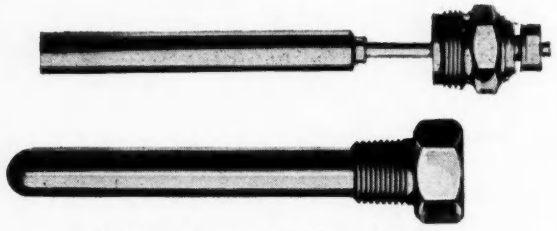
Automatic Control in the Textile Industry

F. S. WARD and R. D. CLEVELAND†

IN TALKING to a group of technical men in any industry, one associated with process work in that industry only in a superficial way must attempt to avoid many pitfalls. For that reason this paper will deal largely with the correct use and application of instruments rather than a technical discussion of individual processes. You gentlemen then can pick out any parts that are applicable to processes in your own plant, be they cotton, silk or woolen, and perhaps thus obtain a thought or two that will be helpful.

The first requisite in the installation of any controlling or recording instrument is correct exposure of the sensitive bulb to as near representative conditions as possible. As simple as this may appear, it is very frequently given little consideration and many times incorrect installations in this respect are very bothersome both to the user and supplier of temperature equipment. For the sake of argument we can assume the average bulb length on an instrument approximates 6 inches. If this were to be installed in a 4-inch pipe line, it is obvious that it could not be screwed into the line and across the flow of fluid in the pipe. In cases of this kind we often find a pipe coupling welded onto the pipe so that when the bulb is screwed into place part of it is pocketed in the coupling where it is not subjected to average conditions. An installation made in this way will often cause the instrument to read low by 8 or 10 degrees and at the same time makes it sluggish in showing temperature changes. It is a point well worth remembering whether the bulb is inserted into a pipe or tank in this way and some method must be found to avoid it.

The next point has more to do with the actual construction of the instrument itself. I have here a sample of what is known as a Thermo-speed separable well, with a dummy bulb inserted. This is so designed that the bulb within the well receives much better thermal contact than in the conventional construction and the instrument made up in this way is therefore approximately six times faster in speed of response and is as much more accurate in its readings at all times on rapidly changing temperatures as that greater speed of response would indicate.



Taylor Thermo-speed Separable Well.

Not only does the Thermo-speed construction provide better thermal contact, but it also eliminates the temperature error of heat conducted from the pipe line through the well to bulb which often times amounts to several degrees. This is accomplished by using 3/16 inch O. D. 18-8 stainless steel connecting tubing between the bulb and the union swivel nut. With this construction you will note that there is an air space between the end of bulb and swivel nut. This air space and the small diameter 18-8 stainless steel connecting tubing offsets the small amount of heat which is conducted to the bulb by the well between the bulb end and swivel nut. The temperature error is reduced to almost nil. I will pass this around so you can all see it and understand how a Taylor Thermo-speed separable well tube system is assembled. These bulletins here describe this in greater detail and you are welcome to them.

The above points concern all temperature equipment whether indicating, recording or controlling and when considering applications of automatic temperature control they must be given careful thought, and in addition many other points must be considered for successful results. Here the first consideration is the selection of the proper instrument itself. We do not wish to apply the most simple and least expensive instrument on the most difficult job and conversely, we do not want to sell a Packard where a Ford will serve just as well. A thorough study of the problem involved usually clarifies this point and a proper recommendation can be made. As you undoubtedly know, control instruments range from the so-called self-contained or self-acting type through indicating and non-indicating air operated control to the cam and air operated recording controllers used on piece dye tubs. Each has its own field of application.

It might be well worth while at this time to briefly explain why there are more than just one single form of controller since it is obvious there is a reason. There are many diversified industries in the field and in most everyone there is a process or processes that require what might

*Presented at meeting, Northern New England Section, November, 6, 1936.

†Taylor Instrument Co.

be termed fair control, that is to say, controlled temperature within an overall variation of plus or minus 5 to 10 degrees F. and then there are applications where the precision control or plus or minus one-quarter degree F. is necessary.

On the former it is only natural that a less expensive and less efficient control such as the self-acting type controller would meet the demands, but on the precision control requirements an instrument such as the Taylor Fulscope recording controller is necessary. In this latter type of instrument you have all the mechanical features available to produce the straight line temperature or pressure control under most severe control conditions, but there are still many applications where it is necessary to go beyond the Fulscope control instrument. Here it is necessary to use an instrument which will compensate for great load changes and time lag so as to maintain the original set point and an instrument such as Dubl-Response is used in conjunction with the Fulscope to accomplish this. The oil industry, power plants, etc., offer a great field for this type of control. The instrument manufacturers are constantly developing new instruments and are compelled to do so because of the ever-increasing demand for greater precision in control and with such a problem as this confronting them it is obvious that many and various forms of controllers are necessary to suit the many and varied applications in industry.

A typical application of the self-acting temperature controller is the crab. Here all that is required of a controller is a mechanical means, temperature operated, to open and close a valve with considerable temperature change occurring at the bulb, yet holding the water temperature sufficiently close to give satisfactory processing.

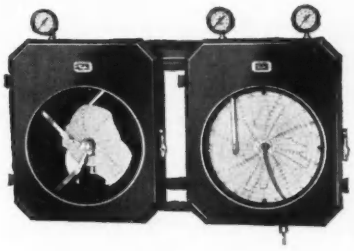
This same application could be controlled much closer with any one of the air operated controllers if the application warranted it.

There are applications in the textile industry where control has almost become a necessity if the processing is to be carried out to the best efficiency, and among these are dyeing, rayon and cotton slashing.

Time will not permit in this paper to discuss these three very important temperature applications in detail, but we will discuss two of them very briefly and dwell longer on the most important of the three from the standpoint of instrument application.

In piece dyeing you all are familiar with this process and its troubles, many of which can and are now being eliminated due to temperature control equipment properly designed and installed and careful detailed attention given to the piping, etc.

In the past most control equipment used gave intermittent valve operation on the steam line which was very objectionable since an even steady flow of steam to keep the dye liquor just to the boil is so much more effective. The newly designed time schedule cam recording controller, wherein is incorporated the sensitivity reducer, can be adjusted to produce a straight line temperature control all during the period of the rise starting from room temperature to the boil and will hold the temperature during the boil equally as well. It is from such control as this that uniform dyeing results and as much as 25 per cent steam savings are effected. Here the Taylor Tyme schedule controller is used wherein the time required to bring the dye liquor from room temperature to a temperature slightly under the boil is controlled automatically and after the boil is reached it is maintained not by intermittent surges of steam, but by that even steady flow of steam which produces the best results. Piece dyeing done with automatic temperature control effects better penetration, greater uniformity, reduces the number of redyes, relieves the boss dyer of a great responsibility all because the instrument performs the duties even more reliably than a good kettle man.



Taylor Tyme-schedule Controller.

Since the average dye tub uses approximately 2,000 pounds of steam per hour, a 25 per cent steam saving that can be effected with automatic temperature control, the saving in dollars and cents alone warrants its use and is a good sound investment. Where many tubs are in operation this saving alone can run into thousands of dollars yearly.

Rayon slashers, particularly the Johnson cylinder type are among the chief pieces of textile processing machines where temperature control is essential, since you all know the troubles in the weave room which can be traced directly to the slasher from poorly slashed warps. Here it is that the patented Taylor system of the well-known slasher control is applied with most excellent results.

As you all know, warps which are poorly slashed are due to either over or under drying or improperly applied sizing due to temperature or level changes in the vat and these are immediately reflected in a lowering of the weave room efficiency. With temperature control properly installed and adjusted to the particular type of warps being slashed, maximum weaving efficiency is assured. This application cannot be controlled on a pressure basis with pressure control instruments and obtain the same results or near the equal to that obtained with a real system of temperature control.

There is still another slasher application better known to the cotton mill industry where great strides have been made toward the betterment of slashing which results in

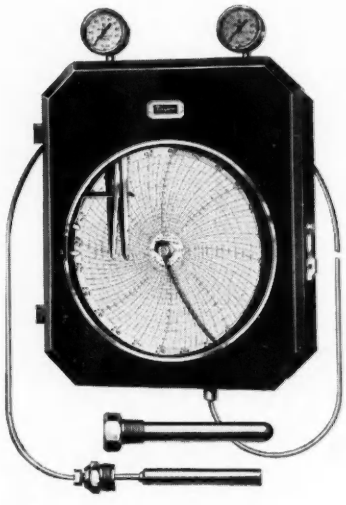
greater weaving efficiency, increased production and a greater uniformity of cloth weights, better feel of cloth, decreased steam consumption, etc. Here Fulscope recording controllers, thermometers and Type "P" controllers, all air operated types, are used to produce very close temperature control. Temperature control alone cannot give the maximum results which can be had, for in many installations which we have made conditions have immediately become worse upon starting the control equipment, which of course, does not continue to exist because our field engineer starts at once to make corrections in the size, cooking, cylinder temperature, speeds, etc. This is known as balancing and usually requires one to four months' time to complete on an engineered installation. The entire machine and temperature equipment must be so balanced as to produce slashed yarn ready for the weaving room at the proper moisture and size content. Each and every instrument plays an important part toward obtaining the results desired. In every installation we have made we have been credited with great steam and cotton saving, 1 to 2 per cent increased production over the entire mill, all of which represents a substantial saving in dollars and cents and will easily pay for the original cost of equipment in less than twelve months' period of operation.

In many mills prior to the installation cloth weights vary considerably, shedding at both the looms and slasher is excessive and many looms stopped because it was nearly impossible to weave the poorly slashed yarn. These conditions are practically eliminated when the final balancing is completed.

With the advent of the recently developed high speed cotton slasher by the Saco-Lowell Company and the close cooperation of the Taylor Instrument Cos., a mechanical machine is now available whereby 100 per cent increase in production is assured over the older types of slashers and here more so than ever precision temperature control is the vital factor which makes it possible. Such speeds as are obtained with this new high speed slasher would be impossible without automatic temperature control since the slightest deviation from the set operating temperatures will change the moisture content of the yarn on the loom beams and thereby change the weaving efficiency to a great degree. Also in view of the speed where 80/yds./min. of several thousand ends of yarn are depending on precision temperature control, the lack of close temperature and size box level control for a single minute would ruin many yards of warp yarn and effect considerable financial loss.

This machine is now about ready for sale. Many mills already know about it and are awaiting its final release. Without question it will go a long way towards increasing efficiency and decreasing costs in the cotton mills, weaving sheetings, print cloths and all of the heavier constructions.

Another common and very worth while application for temperature control is the carbonizer in a woolen or worsted mill. The carbonizer baker temperatures must be exact if the required reaction is to take place. Varying temperatures in the baker cause variations in results, which in the case of carbonizing preceding dyeing, end in rust spots and the consequent uneven dyeing. On this application the Fulscope type of recording controller is usually recommended because its universal sensitivity adjuster assures a smooth throttling action which is necessary if close regulation is to be obtained. This is not the easiest application on which to effect close control of the temperature because of the usually great variation in weights of cloth passing through the baker and because of more or less frequent stops. You can readily see that a change from 10 oz. to 20 oz. material puts a greater load on the baker and the steam demands immediately increase. An instrument must be capable of almost sensing such a change in advance and take the new load in stride.



Taylor Fulscope Recording Controller.

I have tried to point out a few of the common applications in textiles for automatic temperature control. This has been done chiefly to let you know what has and can be accomplished and to help you visualize possible other applications on which I might be able to give you some information.

In closing I wish to thank all of those present for their kind attention and for this opportunity to present this paper, and now if you have any questions to ask, I'll do my best to answer them.

DISCUSSION

Q. In looking over the circular and sample, there seem to be quite a number of parts outside and inside and I am interested to know what each of these are.

A. I can probably tell you better why we made it that way. Using a separable well like that, you have to have some sort of a contact between the bulb and well inside of the passages in order to give us the temperature to be

conducted from the well to the bulb quicker than over the air space. To increase the contact between the separable well and the bulb, we use aluminum which is stronger and thinner than other metals that have been used, reducing the conduction of heat between the bulb and the well and not giving as accurate results. You will notice that it is a corrugated piece of aluminum as that gives it a springy effect so that it can be pressed in tightly giving better contact. You will notice an air space between the end of the bulb and swivel nut. Of course, in order to get the temperature of the air down, we use that small stainless steel connecting piece between the bulb and the swivel nut so that the temperature that is conducted along the well through the thread itself down to the bulb is more or less offset by this air space above and between the bulb, so that we can cut the error down to practically nothing.

Q. Do you use a non-conducting packing around the bulb?

A. To a certain extent. The idea is to eliminate conduction of heat through the nut as the pack itself does not conduct much heat to the tubing. One reason we use stainless steel is because it is a poor conductor of heat.

Q. Can you record relative humidity in a dryer?

A. Not when you go above 212° F. We do have an instrument that we call our wet and dry bulb instrument. The bulb is located inside on a wet tunnel and we have one bulb covered with a wick and a continuous flow of water going through the wick keeps the wick wet and at all times we have a wet reading of the temperature inside the room. Another bulb gives us the dry bulb temperature. From the difference between the two you can calculate the percentage of relative humidity. We have no direct reading instruments. It is really a two-bulb instrument.

Q. Where do you prefer to put it, inside a box or in the room itself?

A. Wherever you want the humidity measured. If you put your wet bulb panel on the inside in the air line, we really have a better velocity of air passing the bulbs which is very desirable in measuring humidity. The bulbs should be in places where the air passes at about 600 cubic feet per minute for accurate readings.

The Measurable Properties of

Vat Printing Pastes*

SIVERT N. GLARUM†

MOST of you know more about textile printing than I do. However, as you know there is little opportunity for carrying out a research program in the print works. Every effort must be exerted to keep up production and when research is attempted it always gets shoved aside to make way for plant problems. In the solution of these problems speed is usually the first consideration, and the first solution is the one that is used whether it is the best or not. If it works, it works, and that is all that is necessary to get the wheels turning again.

The object of this study is to try to find the best solution to some of these problems rather than the quickest. It is of course impossible to take up each of the thousands of questions individually but it is our belief that if certain fundamental principles can be established they will lead to the answers to a great many of these questions.

In other words, we might describe this as a study of "whys." "Why" do certain printing pastes give one result while another one which appears to be identical gives an entirely different result? "Why" does this happen, or "Why" that? Those are the things for which we are searching.

At the start of this project it was necessary to get first-hand information on the process of printing, and the only place to get this was directly from the print works. It was not always easy. Textile printing has been, and still is to a certain extent, a secret art, and the idea of having an outsider going in for the express purpose of learning what was going on was rather shocking to some.

However, everyone we called on for assistance granted us access to the works, after we promised not to divulge any secrets that might be of value to others. I am glad to be able to say now that every single print works that we visited gave us all the information we wanted and all the materials requested when they learned just what we were after and found that we were not going to steal any of their secret processes and go over to their neighbors with them.

The first conclusion reached was that a fundamental study of vat printing pastes could include just about everything from making the cloth to selling the goods, and all do have an important bearing on printing. The first thing we did was to draw certain limits. We limited the project to the study of those operations which deal with putting

*Presented at meeting, Rhode Island Section, April, 1936. The paper presented by Mr. Glarum at the Annual meeting will be published at a later date.

†Research Associate, A.A.T.C.C.

the dye on the cloth and fixing it. This can be divided into three steps, (1) preparation of the mixture of dyestuff, chemicals and thickener, called the printing color, (2) printing in the machine, and (3) ageing and subsequent oxidation.

Ageing is probably of the most general interest, because it is little understood and has an enormous effect on the color value. We have played around with agers and have made measurements of temperature, attempted to measure the maximum temperature reached by the cloth, and we have analyzed ager vapors, but we aren't far enough along as yet to be able to draw any conclusions. One point might be worthy of mention. It seems to be a fairly wide belief that part of the temperature rise in the ager is due to the reduction of the dye. This reaction actually takes up heat, however, in the case of the vat dyes that have been tried. You can show this fairly easily by mixing a solution of the reducing agent with a solution of the dyestuff after bringing both solutions to the same temperature at about 95-100° C. A small but definite decrease in temperature will occur.

Before you can age the print, you must print it, and before you can print, you must make up your printing color, so that seemed like a logical starting point.

Most people in the textile printing business have at some time wished for a "perfect" printing color. That is a big order, as such a color should produce a good print regardless of pattern, engraving, printing conditions, ageing, etc. While waiting for this perfect color to be developed, we have tried to determine what might be the best color for a particular class of work, namely, patterns made up of fine lines and small marks.

In the initial study, we measured a number of physical properties of these colors, but the only one that seemed to be important was the way they flowed. In actual printing, most of the working qualities depend on the way the colors flow. I have purposely tried to avoid the word viscosity, because that term seems to be in general disrepute in all print works. I think I can tell you why. We have tried a number of methods of measuring flowing properties, and the one we found best suited for this purpose makes use of the Stormer Viscometer. The only change made in this instrument was to replace the weight supplied with the instrument by a hook so that any desired load might be applied to the driving cord.

The apparent fluidity of the printing color is then measured with a series of loads from 1,000 to 50 grams and the fluidity values plotted against the loads. This gives the flow curve for the sample.

These flow curves show how the flowing properties of the sample change with the stress. For a true liquid the fluidity is constant regardless of the stress so the flow curve is a straight line at a constant fluidity. For printing colors the apparent fluidity increases with increasing stress giving a flow curve that is usually concave toward the load axis. It is apparent, therefore that any *one* measured value of the fluidity or viscosity will depend entirely upon the conditions under which it is measured and will tell us little or nothing about the true characteristics of the sample.

The following slides will show the close relationship existing between the printing qualities of colors and the flowing properties as shown by these flow curves.

(From this point on the talk was illustrated with lantern slides. The material presented and the flow curves shown were similar to those published in a paper in the AMERICAN DYESTUFF REPORTER *25*, P150 [1936].)

It is apparent from these results that we can quite accurately predict the printing qualities of colors from the flow curves measured in the laboratory. It must be remembered that the limits shown here were for colors used on fine patterns. It will be necessary to vary these limits for other classes of work or to meet abnormal printing conditions.

DISCUSSION

Q. If you take two measurements, one at 100 and one at 1,000 g., can you be sure that if a curve falls in the right section the print will be good?

A. Yes. If the flow curve of a color falls within the limits shown it will give a good print on a fine pattern under normal printing conditions. There are of course, certain chemical requirements which must also be satisfied.

Q. What happens if the color is heated?

A. You have the same shape flow curve but it is moved to a region of higher fluidity. That is what happens if you have a hot roller. The color might have good properties when you start but they will be changed when the color is heated by the roller. In the curves shown there were five or six colors that tested good but gave only fair prints. Most of these were being printed under known abnormal conditions; three with hot rollers. If we made allowance in our figures for the cases where there were *known* abnormal conditions it would increase the accuracy of the results to 95 per cent.

Q. Were those all freshly prepared printing pastes?

A. Yes, they were obtained directly from the tubs under the printing machines and tested within 24 hours of the time when they were taken.

Q. I understand that some doubt may exist concerning the pressure on the roller, the doctor as we call it. In that case, does it leave all your answers in doubt?

A. Not at all. There are two ways of getting at the problem. One is to measure every detail of the conditions under which the color is printed, such as pressure, speed, engraving, doctor, etc. And then to take measurements on the colors exactly duplicating these conditions.

The other method is to measure the properties of the colors under a wide variety of conditions and determine

at what points the results can be correlated with the results of printing.

We have chosen this second method as being more suitable.

Q. Have you measured fluidities at higher pressure than shown here?

A. We have tried to develop a machine a little simpler than this and with it our measurements start about where the curves shown stop. It will go up to about ten times the range shown here. The curves are practically continuous.

Q. At those high rates of shear can you use paddles?

A. The cylinder covers the same range as the paddles on the Stormer. For high rates of shear we used a piston with holes in it, forcing it into a closely fitting cylinder containing the paste or color. A wide variation in rate of shear can be obtained by varying the pressure and the size and number of the holes in the piston. The flow curves obtained in initial tests were similar in shape to those obtained with the Stormer.

Q. What is the difference in the speed with Gum Arabic with 100 g. and with 1,000 g. in the Stormer?

A. You get about a 10-1 ratio. The speed is proportional to the load within the limits of experimental error.

Q. Did you notice any relation between color value and brilliancy in your work?

A. No, we have not yet studied the problem from that angle.

Q. Do our friends in the print works show much interest in the color yield?

A. Very decidedly yes.

Q. You showed a different type of curves for Aniline Black. Was that true throughout the different print works?

A. Yes.

Q. That would indicate that the type of product used was approximately the same or else the effect of Aniline Black produces that particular kind of a curve. I am trying to find out if the type of curve of Aniline Black is due to the paste used or due to the chemicals having an effect on the printing paste.

A. It is undoubtedly due to the paste used as that type of curve is obtained for all pastes in which straight corn or wheat starch is the thickening material.

Q. Have you tried to determine the effect of the cooking of British Gum on the viscosities?

A. No, I have not. With Tragacanth, we had some trouble trying to duplicate results as the pastes were very sensitive to slight variations in the cooking. We finally developed a method by which we could duplicate results but it is necessary to use extreme caution. Only preliminary tests have been made of British Gums but we expect to follow this further very soon.

Q. When a poor color is replaced by a good one, is the new one made from the same material or is it made up new?

A. It may be done either way.

Q. After a run of several yards would you find any lint in those pastes?

A. All the samples of color were taken from the tubs under the printing machines so there was very slight possibility of any lint being present.

Q. Did you have any occasion to notice whether any of the color pastes foamed?

A. No. I was on the lookout for that. It is odd but whenever we start looking for poor colors no one has any.

Q. Don't you think the per cent error might be eliminated in the consideration? Would the number of crush rollers have an effect?

A. Most of the error would be eliminated if we made allowances for the abnormal printing conditions noted. The chief trouble is hot rollers. The number of crush rollers will have an effect. These colors, however, were used on fine patterns, which are seldom passed under many crush rollers.

Q. To the average man in the plant, British Gum is fairly good, starch not so good. In the plant we have known that for years. Can you give us an idea what will give a good print?

A. Not starch. As soon as you mix a starch paste with something, you get a curve that is entirely different from that with straight starch. I would not say that any particular thing would give a good print and another would not on the basis of our studies right now, but the next project we have in mind is to study a variety of materials and their effect on the flow curves and find, if possible, what will give us the type of curve that is desirable.

Q. It doesn't make any difference what gum you use so long as the printing paste has a curve falling within this region?

A. That is true. Our results are from five different plants. A variety of thickening materials and formulas were used. All the pastes that have given good prints fall within these limits.

Q. Did you notice any difference with different dyestuffs? Did all Vat dyestuffs give the same results?

A. The dyestuff does not affect the flow curves greatly. The shape of the curve is almost entirely dependent on the thickeners used.

Creative Art in Textile Design*

BERNICE JAMIESON and GRACE RIPLEY†

THERE is no lack of creative imagination in America today. The evidence of our industrial designs testify to this. The advancement made in printed and woven textiles in the last ten years in America, is surprising and gratifying. The experiments made in novelty yarns and threads, in the manufacture of novelty textures and weaves have given us beautiful and unique fabrics. The chemist has played a valuable part in the permanency and long life of color. Textile Organization from the high executive down to the creative experimenter should be congratulated. With all this to America's credit she still has a great deal to learn from European countries. First, they glory in their designers and pride themselves on being original. American designs too often masquerade as imports. Can it be that America has an inferiority complex? She has often been accused of hiding her designers' light, under a mask of fear. Fear that her color schemes and designs are inferior to those of our foreign relatives.

The pioneer period in American industry is over. We were richly endowed by nature and we have used nature's gifts lavishly. We must now turn our attention to the creative achievements of man. We cannot always copy the creative accomplishments of our European cousins. We shall always admire them, and appreciate their greatness, while we realize that our own creative minds must express themselves and be appreciated by our own countrymen.

The Celanese Corporation of America last year paid the French artist, Marie Laurencin, a very large sum of money to make some designs for dress and drapery materials. This artist is famous the world over for her very tender portraits and flower pieces. The designs she made were very beautiful and she had her name printed on the selvage. We have artists in America but how many textile manufacturers ever put an American designer's name on the selvage? We hear of the American inferiority complex. This complex is common to textile manufacturers but not to American manufacturers of automobiles, airplanes, radios, or bath tubs.

The furniture and household designs of Gilbert Rohde, director of the Design Laboratory, New York, a project sponsored by the U. S. Government, are well-known and his name is attached to the designs he sells.

The automobile business of America leads the world and one reason for this is because it faces its design problem and solves it on a purely creative and functional basis. We all know what happened when Ford clung to the obsolete design of the model T. We also know that when he saw the necessity of leading in design, he established a design department, which produces new ideas all the time. Special designers like Walter Teague are hired for a year at a salary vying with that of popular movie stars. All the time painters, sculptors, craftsmen in wood and metal are kept busy creating new ideas, many of which are shelved while many of the ideas are used. The designs of motor cars looking two, three and four years ahead are under development now. We realize that beautiful originations have been projected by many textile industries and that many of them have come out, under foreign labels or foreign names. We know that the World's Fair in New York is coming, when all industries will be exhibited. In the American textile division shall we show American designs by famous American designers? Shall we show original concepts or borrowed foreign ideas? For the glory of America we hope that the creative excellence of the American mind will be recognized.

The theatre advertises its creative artists. Norman Bell Geddes is known as the designer of the play, "Dead End," but even the electric companies have no idea he designed their best seller electric stove. Major Bowes believes in advertising creative artists. We know that we have great creative costume designers. Adrian and Omar Kiam of the movies, Hattie Carnegie, and Elizabeth Hawes, and Frances Klein are famous all over the world.

Helen Dryden designed the interior fixtures of one of our greatest automobiles. She has designed magazine covers, with her name in the corner, bathroom fixtures, wall papers, all loudly acclaimed but her textile designs, tender and beautiful, are wrapped in obscurity. The great textile industry of America with all its branches, should maintain one research department dedicated to the development and recognition of creative textile designers.

America is beginning to be recognized in the field of ceramics. An exhibition of American creative ceramics is to travel in Finland, Norway, and Sweden by invitation of these countries. This is the first time in American history that this has happened. This is a good start. Where are our American textiles that can say the same? America is beginning to hold her own in the field of painting and graphic arts and express American life as seen through the eyes of the artist.

*Presented at Friday evening session, Annual Meeting, Providence, R. I., Dec. 4, 1936.

†R. I. School of Design.

Howard Cook of Springfield has twice been awarded a Traveling Scholarship for creative work by the Guggenheim Foundation. He has made frescoes in the Court House in Springfield and Pittsburgh. He is one of the outstanding wood engravers in America today.

John Curry hails from Kansas. He is now finishing a mural for the U. S. Supreme Court. Wisconsin knows his worth for he has accepted a job as "artist in residence" at the University of Wisconsin at $4,000 a year. His duties will be to mingle with the students, and informally converse with them on the subject of Art Appreciation.

Thomas Benton comes from Missouri. His murals of Indiana appeared at the Chicago World's Fair in 1933 and are now the property of the State of Indiana. He also designed the mural in the School of Social Research, New York City. His individual style is quite contrary to the standardized treatment of murals.

America heads the world in designs for kitchen and bathroom fixtures. Our designs in this department of life are copied all over the civilized world. But the shower curtain by an American designer is not known as an American origination. Is the curtain material of the kitchen window as smart and clever as it is, an American design? The oil cloth and linoleum, by whom are they designed? You may have glass by LaLique of Paris and Verley of the U. S. A. Faucets designed by Helen Dryden . . . Pewter for the dining room by Wendell August . . . can we not have curtains signed by an American designer for the glory of America?

We admire the great artist, *Rodier*, who loves wool, and devises the most lovely and unique wool materials. Rodier puts quality of production before quantity. He surrounds himself with great craftsmen who live in beautiful cottage homes in quiet villages and whose whole life is given over to creating spun wool threads of great and unique beauty combining the wool with many other fibers. Great fees are paid Rodier to devise ways of combining rayon, celanese, cellophane, raffia, hair, feathers and even paper with his wool threads. The creative artistry of Rodier is so great that the result of his efforts is always charming although not always practical from the mass production standpoint. Great American industries of the future will probably have creative departments experimenting as craftsmen to devise novelties which can be translated into mass production goods. Rodier's motto is "Quality is never an accident."

Biachini is another French house which is regarded with awe and respect by Americans. Biachini started as a weaver, beginning at the bottom as so many of our successful American men do. After becoming a weaver, Biachini became a salesman and after a few years of successful selling he chose two partners and started a business similar to that of an American converter. He made his own designs, sold them to wholesalers and then contracted to have the goods manufactured. He was successful from the first, and accumulated enough money to buy a small factory. Today the house of Biachini stands for the highest standards of quality and beauty of design. Biachini is anendless experimenter and he too surrounds himself with creative craftsmen. Paul Poiret has come back this year with some gay designs having his name on the selvage.

A great European craftsman is Fortuny of Venice, Italy. Fortuny's hand-decorated fabrics pour into this country every year and are used by the discriminating. They are very fashionable and very lovely. The Fortuny designs have been copied for mass production but not successfully. There is a subtle beauty in these hand-made fabrics which has never been successfully copied by machine.

England is beginning to feel a desire for something new after long years of copying classic designs and foreign importations. We find wonderful modern designs for drapery fabrics coming from the hands of England's creative artists. Hand weaving is important in England as a means of experimenting in new combinations of colors, textures, and pattern weaves.

A great honor has been paid to Elsie de Wolf, an American decorator. She has been commissioned to redecorate Buckingham Palace for the new King of England. Here's hoping he can use it. Her choice of designs is influencing American buyers today.

Ruth Reeves is one of our foremost textile designers and experimentators. Her craftsmanship is as advanced as that of the French designers. What is on the selvage—her name? No—the words "fast colors."

The Design Registration Bureau established by the Silk Ass'n of America, Inc., in 1931, has helped to prevent copying of designs. Here designs are registered by the manufacturer or converter for a small fee. This is a bit of encouragement for the creative designer as well as a protection for the courageous manufacturer.

France wages war on the design thief and blessed will be the day when the American government will force this issue.

The child plays a big part in the creative expressions of a nation. His creative powers start at an early age and his efforts are full of energy, vitality and imagination. He paints and draws in color for the joy of it and intensely feels his subject. Craftsmanship enters into his efforts and develops his sensitiveness to his materials, his skill in handling his tools.

The old idea of craft teaching in schools was to train students as skilled workmen for the trade. We feel that today that training should be two fold. 1. The development of initiative and creative power. 2. The experiences in handling his tools and materials skillfully, adequately and with understanding. Through these processes he gradually develops a feeling, skill and knowledge of his

materials and tools which are essential points in the making of a true creative personality.

These elements of knowledge, feeling, and skill are carried with him into the industry. He must know the market, the trends of the times, must be in constant touch with the factory and salesroom, he must constantly ask himself the questions: What and how is it to be made? What is its purpose and function? Is it beautiful to look at? After solving these questions the creation will develop, and finally becomes a joy to look at, which fits its purpose, function, and fabrication.

Through these creative processes we will be gradually raising our standards of design, will be solving our own problems to fit our own needs of living which will lead us to new horizons of pure American expression.

—♦♦—

Stainless Steel*

CURTIS C. SNYDER†

MY remarks are going to be brief, for I believe that you gentlemen—members of the A.A.T.C.C.—will be more interested in seeing the actual operations involved in the manufacture, the fabrication and the application of Stainless Steel, rather than having a lengthy discourse from me. I do believe, though, that a few introductory remarks would be apropos.

The loss of millions of dollars annually to Rust and Corrosion has been appropriately called "The Rust Racket", in which the atmosphere, the elements, sulfur-laden smoke, salt air, salt water, and various corrosive reagents encountered in industry are the racketeers.

No less an authority than Sir Robt. A. Hadfield, eminent British Scientist and Metallurgist, made the statement in 1922 that the annual loss due to corrosion of iron and steel was about three billion dollars. Again in 1932, he estimated the wastage for the previous year as sixty-seven million tons, this figure being nineteen million tons more than the actual iron and steel production for that year. I mention these figures only to give you some idea of the magnitude of the Rust Racket.

We are all familiar with the expense incurred in our homes as a result of the Rust Racket. The troublesome items are the water pipes, the furnace smoke pipe, the window screens, spoutings and gutters.

But it is in industry that the real expense is encountered. Some of the industries most vitally concerned with the effects of the rust and corrosion racket are the meat packing industry, the dairy industry, the food and baking industries, the chemical industry, the textile and dyeing industry, the brewing and distilling industries, the automobile industry, the paper and pulp industry, the mining industry, and numerous other industries of less import.

Stainless Steel, as you may or may not know, was discovered by investigators of two different nationalities, in the period of 1910 to 1914. Strauss of Krupp Works, Germany, who obtained patents on the 18 Chrome 8 Nickel types of Stainless Steels, and Brearley, of England, who developed the cutlery stainless steels which are of the straight chrome type. So while we have known of Stainless Steel for twenty years or more, it has only been since 1925-30 that it has been extensively used. Like any new method or new material, there is always a period during the introduction of it when there is a decided lull. The prospective user must be convinced that it is a superior method or a better product than his present one. Time is required for tests and experimental work. And then to be sure that the results were not accidental, tests are repeated. The machine and equipment builder must learn the fabricating characteristics of the metal. Sometimes new equipment was needed to properly work Stainless Steel, for it is tougher and twice as strong as common steel, and many times that of copper and aluminum, tin and other non-ferrous metals and alloys.

The dormant period for Stainless Steel ended about 1929. It has passed adolescence and is now mature. Today, we refer to our product as "Enduro, the perfected Stainless Steel", and that is what we sincerely believe it to be.

As engineers you are interested in knowing the chemical analyses and physical properties of Stainless Steel. There are a great variety of Stainless Steels which can be divided roughly into two groups:

(1) Those containing chromium, which are magnetic.
(2) Those containing both chromium and nickel, which are non-magnetic.

The Chrome-Nickel, or 18-8 type as it is commonly called, is recommended for most applications where corrosion is serious. It has greater corrosion resistance than the straight chromium types and furthermore, it has better fabricating properties, being more ductile and lends itself better to welding. Both types contain very low carbon content, under .12, with from 12 to 18 per cent chromium in one case and 18 per cent chromium and 8 per cent nickel in the other. The balance, of course, being iron.

*Presented at Friday evening session, Annual Meeting, Providence, R. I., Dec. 4, 1936. These remarks preceded the exhibition of a motion picture showing the manufacture, fabrication and application of stainless steel.

†Republic Steel Corp.

Both types in the annealed condition have a yield point of about 35,000 lbs. per sq. in. and a tensile strength of 80,000 to 90,000 lbs. When a hard temper is required, such as for conveying belts, springs, or similar parts, 18-8 can be furnished with 150,000 lb. tensile strength or higher.

At the start I mentioned that the annual toll due to rust and corrosion was about 67,000,000 tons of Iron and Steel, or roughly three billion dollars per year. The Textile Industry is a heavy contributor to this "Rust Racket" as it has been so aptly termed. Through endless research and experimentation The Republic Steel Corporation has provided the engineer with a readily available means of putting a halt to these staggering losses. Stainless Steel is your weapon,—whether or not you will apply it to your corrosion problems, or whether you would rather be faced with high maintenance costs, frequent replacements, expensive rejections of materials and numerous shut-downs due to repairs, is for you to decide. I am quite confident in view of past developments that your answer will be the same as that of your associated industries. The value of Stainless Steel cannot be expressed any better than in the words of one of your contemporary engineers, who said—"I let Stainless Steel take care of the corrosion problems and I spend my own time operating the plant".

I know you gentlemen will be interested in learning of the recent developments in Stainless Steel and the reasons for the tremendous increases in Stainless Steel product that have occurred in the past few years.

Take your own industry—The Textile Industry—as a leading example of this. In 1930 there was perhaps not more than five or ten tons of Stainless Steel used for the bleaching, dyeing and wet processing of Textiles. In 1936 approximately one thousand tons, with a value slightly less than a million dollars, will make its way into new durable equipment.

The hi-speed light weight Stainless Steel Trains will employ many more tons of Stainless Steel this year than the entire production of 1926, 25 per cent of that of 1932.

One of medical sciences greatest contributions in recent years has been Insulin, for the treatment of Diabetes. There have been many problems in connection with the production of Insulin—a major one to find suitable materials for equipment used in its processing. The versatility of Stainless Steel was again called upon. Extensive tests indicated that one type of Stainless had merit—a pilot installation verified the preliminary findings—has resulted in a large production installation.

Stainless Steel in colors is really the newest development of which I can speak. The process, which is a combination of chemical treatment and heat, is applied to the Stainless Steel part after fabrication, can be processed quickly, and at small cost. Preliminary investigations reveal the colored Stainless to be of excellent corrosion resistance with a harder surface than naturally.

The Government is spending millions of dollars annually on the Mississippi River Revertment program in an endeavor to control this mighty body of water. So that the results of this work will be permanent, Stainless Steel has been advocated as re-enforcement for the concrete mattresses and for fasteners to tie the mats together. Very shortly a large experimental installation of five thousand mats embodying high tensile strength Stainless Steel will be placed in the river. The Stainless Steel will replace copper clad wire. Even though the initial cost of the Stainless Steel mats may be slightly higher, the ultimate cost, over a period of years, will be considerably less.

Leading producers, designers and fabricators of Stainless Steel believe that it is only in its infancy as far as tonnage is concerned, that its production will increase annually as its use becomes more diversified. There are still some business men who contend Stainless is an artificially priced commodity,—do not feel that its cost is justified. To others Stainless has been their commercial salvation, has been responsible for increased business, wider markets, and greater profits.

An example worth reporting is that of a concern manufacturing Kitchen Utensils. They were forced to undergo reorganization several years ago. Upon resuming operations they started production of a line of Stainless Steel cooking utensils. Today, their production is exclusively Stainless Steel. From fifteen hundred pieces fabricated in their first six months, that figure is now their daily production—their daily bread.

ORGANIZATION, PHILADELPHIA TEXTILE SCHOOL STUDENT SECTION

PROFESSOR ELMER C. BERTOLET was authorized by the Council, at its December 4th meeting, to organize a Philadelphia Textile School Student Section. At a meeting on Friday, Dec. 11th, Wayne F. Fry was elected Secretary pro tem, and presided. A nominating committee was appointed. On December 16th, the following were elected:

Chairman, John L. Waldo; Secretary, Wayne F. Fry; Treasurer, Robert F. Roecker.

Additional members of Sectional Committee, Constantin J. Monego, William Z. Leaphart, Paul C. Peter.

Two permanent committees, Membership and Program, will be appointed. A By-law Committeee was appointed, to report at the next meeting. A speaker will be invited to address the next meeting, at an early date. It is proposed that meetings be held at least twice a month.

Respectfully submitted,

WAYNE F. FRY, *Secretary.*

Methods for the Study and Control of Mercerization*

SIDNEY M. EDELSTEIN†

INTRODUCTION

IN studying the mercerization of cotton in the laboratory, one must be able to control the process under a wide variety of conditions and be able to examine thoroughly the various physical and chemical properties of the mercerized material.

While the commercial mercerization of cloth is just as important as that of yarn, the mercerization of yarn is more easily controlled experimentally. Results of most work on yarn can also be applied directly to the mercerization of cloth.

In the study of the mercerization of cotton now in progress, an experimental laboratory for the mercerization of yarn under various controlled conditions has been set up and various methods for examining the properties of the mercerized yarn have been used.

Experimental Equipment for the Mercerization of Yarns

Figure 1 shows an experimental skein mercerizing machine which allows the control and determination of both the tension and stretch on a skein of yarn.

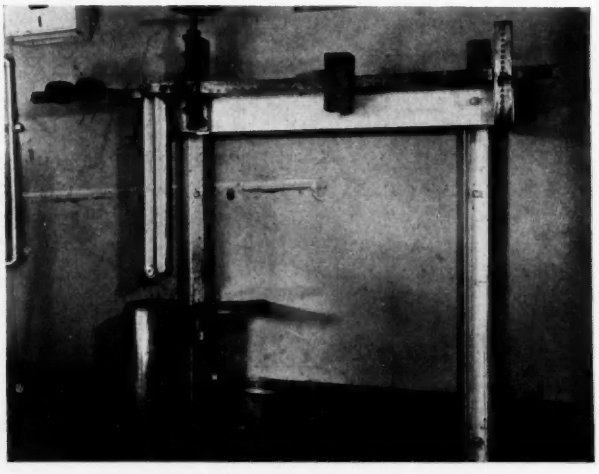


Fig. 1. Experimental Mercerizing Machine.

The upper part of this machine is similar to a beam balance with the exception that the fulcrum can be raised or lowered.

The machine contains two rollers around which a skein of yarn is manually revolved. The lower roller is fixed to a rigid vertical bar and the upper roller fits into a groove in the horizontal beam.

In placing a skein on the machine, the upper roller is removed from the groove and the skein is placed around both rollers. The top roller is then replaced.

By turning the screw attached to the horizontal beam, the amount of stretch on the skein can be regulated to any desired figure.

To determine the tension on the skein at any time, the sliding weight is moved along the beam until the tension on the skein is approximately balanced. The pin which passes through and fixes the right end of the horizontal beam is then removed and the sliding weight adjusted until the beam is exactly level. The graduations on the beam indicate the tension in pounds on the skein.

To place a particular tension on the skein of yarn, the sliding weight is moved to the position indicating the desired tension. The fixing pin is removed from the bar and the fulcrum is raised or lowered by turning the screw until the tension on the skein makes the beam level.

After adjustment of the skein, the tank containing the mercerizing solution is raised and the support placed under the tank. The skein can then be revolved in the solution by turning the handle attached to the top roller.

Following the caustic treatment, the skein is locked in position and revolved in another tank containing wash water. The skein is then removed from the machine, neutralized, washed and dried.

The drying of the experimental skeins after mercerization must be uniform and the conditions must be reproducible.

Figure 2 shows a dryer for the mercerized skeins which has proved satisfactory.

The skeins to be dried are arranged on racks within the dryer in a manner similar to the arrangement within a commercial skein dryer.

Large volumes of air are drawn in through a pipe at the top of the dryer by a fan and this air is heated to the desired temperature by passage over a number of electric heating elements. The hot air passes through gratings into the dryer and leaves through a pipe at the bottom. The temperature within the dryer is constant and can be controlled by turning on or off different heating elements.

*Presented at Saturday morning session, Annual Meeting, Dec. 5, 1936.

†Research Associate, A.A.T.C.C.

Fig. 2. Dryer.

The temperature can also be regulated by changing the speed of the fan.

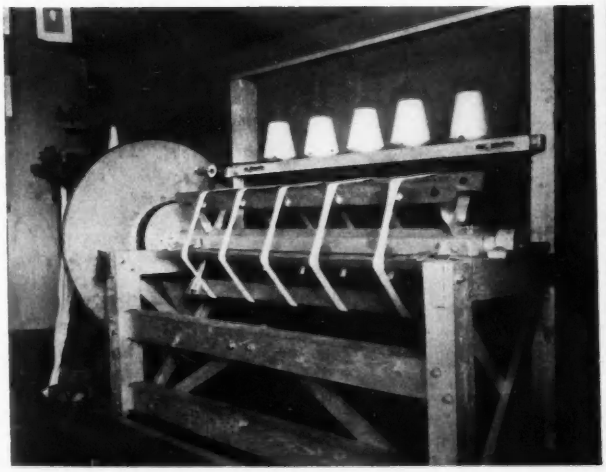
The experimental skeins are made on the reel shown in Figure 3 and after mercerization and drying are wound upon spools on the machine shown in Figure 4. These two machines are similar to those used commercially for the same purpose.

Dye Affinity Determinations

In the examination of the direct dye affinity of mercerized yarn, two different methods have been used which have certain advantages and disadvantages.

One of these methods allows the quantitative determination of the amount of dyestuff on the dyed samples while the other permits a visual comparison of the depth of shade of the dyed samples.

Fig. 3. Reel.



In the first method, 50 mg. samples of the dyed material are extracted with 25 cc. of pyridine solution. After several hours, the dyestuff is removed from the samples and the pyridine extract becomes colored. This extract is compared with a standard solution of the dyestuff in a colorimeter and the amount of dyestuff that was on the sample is thus determined.

This method has the following disadvantages:

1. The dyestuffs used for dyeing the sample must be pure and purification is a long and tedious process.

2. Yellow and orange solutions are difficult to match against standards in the ordinary type of colorimeter.

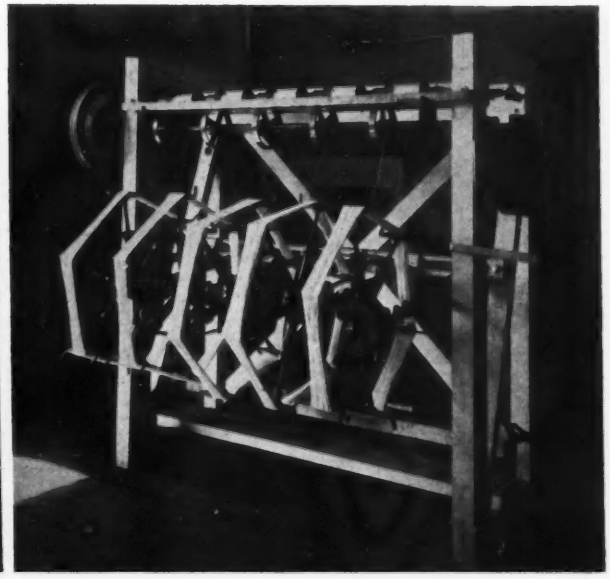
3. If there is any variation in the dye affinity of the yarn, this method may give misleading results since the determinations are made on very small samples.

4. The total amount of dyestuff on a dyed sample does not necessarily indicate the depth of shade of the dyed sample as seen visually. In some dyeings, the dyestuff may be concentrated in the surface fibers, thus giving a greater depth of shade than the determination of the amount of dyestuff would indicate. Because of differences in light reflecting and light absorbing characteristics of different mercerized samples, a given amount of dyestuff on a particular sample might give a different depth of shade from that shown by an equal quantity of dyestuff on a different sample.

This method is useful however where graphs are desired to show the change in dye affinity of mercerized yarn with a certain factor in the mercerization process and where a number of determinations can be made.

The second method for examining the dye affinity of mercerized yarn gives results approximating those obtained in practice.

Fig. 4. Spooler.



In this method fabrics are knitted from the samples and these fabrics may be dyed under a variety of conditions and compared visually for dye affinity. In this visual examination the eye is able to see any unevenness in dye affinity and allowances for this can be made. Pure dyes are not necessary for dyeing the fabrics and a large number can be compared at one time.

Variations in dye affinity as encountered in practice may be easily simulated by this method. For example, in the study of the factors which might cause "tiger stripes" in mercerized yarn, it is possible to take two samples of yarn which have been mercerized in slightly different manners and to knit these in alternative bands into a fabric. After this fabric has been dyed, the differences in dye affinity became apparent and the fabric shows "tiger stripes." A photograph of a dyed fabric prepared in this way is shown in Figure 5.

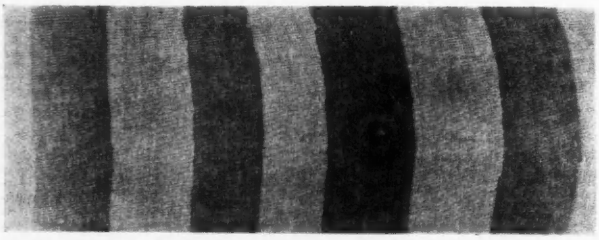


Fig. 5. Fabric knitted from two differently mercerized yarns and dyed to show difference in dye affinity.

This method has the disadvantages in that absolute figures for the amount of dyestuff on the samples are not obtained and records of the results can only be had by keeping the dyed fabrics or by making photographs of the fabrics.

Barium Activity Numbers

Recent work on the Barium Activity Numbers of mercerized material has shown that this determination can indicate the completeness of the reaction that has taken place between the mercerizing caustic and the material in addition to being able of detecting the presence of mercerization in all types of dyed and undyed cotton material.

The determination of the Barium Activity Number of mercerized cotton consists of obtaining the ratio of the amount of barium hydroxide observed from an 0.25 N. barium hydroxide solution by a definite weight of sample to that absorbed by the same weight of unmercerized cotton under identical conditions.

The testing of a large number of commercial unmercerized and mercerized cotton yarns and cloths has shown that unmercerized cotton material is characterized by a Barium Activity Number of 100, mercerized cloth by Activity Numbers between 116 and 130 and mercerized yarns by Numbers between 150 and 160.[1]

Several samples of the mercerized piece goods were remercerized under tension in 50° Tw. caustic for several minutes and after washing, neutralizing and drying, the Barium Activity Numbers were redetermined. These numbers were found to have been raised from 130 to 160 by this treatment.

Unmercerized fabrics of the same construction were also mercerized in the laboratory in a similar manner and the Activity Numbers of the finished material were also close to 160. Remercerization of mercerized yarn having a number of 160 did not increase the activity number of that yarn.

It has also been found that cotton yarn mercerized in the laboratory in caustic solutions stronger than 30° Tw. under various tensions have Barium Activity Numbers close to 160 and that these numbers are not materially affected by various methods of washing out the caustic, neutralization and drying as well as by the presence of impurities in the caustic.[2, 3, 4]

We may conclude from the above that if a sample of mercerized material has a Barium Activity Number considerably below 160, then this material has either been mercerized in a caustic solution weaker than 30° Tw. or else the mercerizing caustic has not reacted to the fullest extent with all of the fibers in the material.

Since commercially a caustic solution near 50° Tw. is used for mercerization, a very low Barium Activity Number in a commercial mercerized yarn or fabric is most likely due to the fact that the mercerizing caustic has not reacted completely with all of the fibers in the material.

A low Barium Activity Number does not necessarily mean that the material having the low number is commercially inferior to material having a higher number.

Studies on the relationships between the Barium Activity Numbers of commercial mercerized materials and the luster, dye affinity and strength of these materials are now in progress.

Luster Determinations

The luster of mercerized material is one of its most important characteristics. Since luster is a quantity which depends on the light reflecting properties of the material, an examination of the light reflections from certain typical surfaces will help to explain the nature of luster.

In Figure 6 is shown the manner in which a ray of light is reflected from a mirror surface, a matt surface and a semi-matt or lustrous surface.

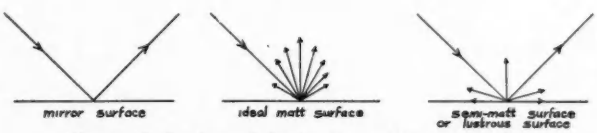


Fig. 6. Reflecticn of Light from different surfaces.

A mirror surface is one which is smooth, polished and unbroken. A light ray striking this surface is reflected in the same plane and at an equal angle with the surface. A matt surface may be considered to be made up of innumerable small mirrors arranged at different angles. Light striking a matt surface is diffused and reflected at many different angles and in several planes.

A semi-matt or lustrous surface is typical of mercerized material. This surface acts like a combination of a mirror and a matt surface. A light ray striking a lustrous surface is partly reflected in a regular manner and partly diffused. The greater the proportion of the light reflected in a regular manner from a lustrous surface, the higher is the quality of luster of that surface.

The eye of a trained observer is able to sum up the various regular and diffuse reflections from surfaces and to obtain a comparison of the luster of the surfaces.

The examination of the luster of mercerized material is based primarily on the visual comparison of the lusters of different samples.

An experienced person is able to detect minute differences in luster between samples of mercerized material but is not able to give a quantitative figure for the luster of a particular sample. Also the eye tires after the comparison of a certain number of samples and the samples become roughened and soiled from handling.

Many attempts have been made to obtain a numerical expression for the luster of mercerized material by measuring the amount of light reflected by the material at different angles and several types of instruments have been devised for such measurements.[5, 6, 7, 8, 9]

No machine as yet is able to give a figure for the luster of mercerized yarn or cloth which includes all the factors that the eye sees in arriving at the luster of a sample.

A machine that measures the light reflections from a material can give separate values for these various factors which are combined together by the eye to give the quality of luster. Also in cases where the samples are the same in construction and color and only differ in luster, these measurements can be used to give a measure of the relative lusters of the samples.

A diagram of a machine which has proved valuable for such measurements on mercerized yarn is shown in Figure 7.

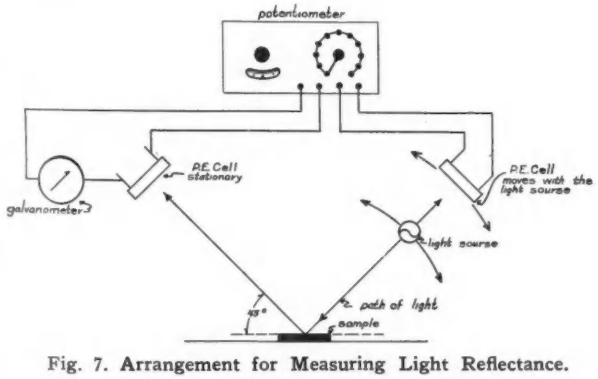


Fig. 7. Arrangement for Measuring Light Reflectance.

The sample of yarn to be examined is wound evenly upon a card and is placed in position on the machine. A parallel beam of light is sent onto the samples at different angles and light reflected from the sample strikes a copper oxide photoelectric cell mounted at 45 degrees to the sample. This cell is balanced by means of a potentiometer against a similar photoelectric cell fixed by the light source. The relative amounts of light reflected by the sample when illuminated at different angles is thus determined.

In Figure 8 is shown a graph of the amount of light reflected by a typical sample of mercerized 40/2 cotton yarn when illuminated at different angles.

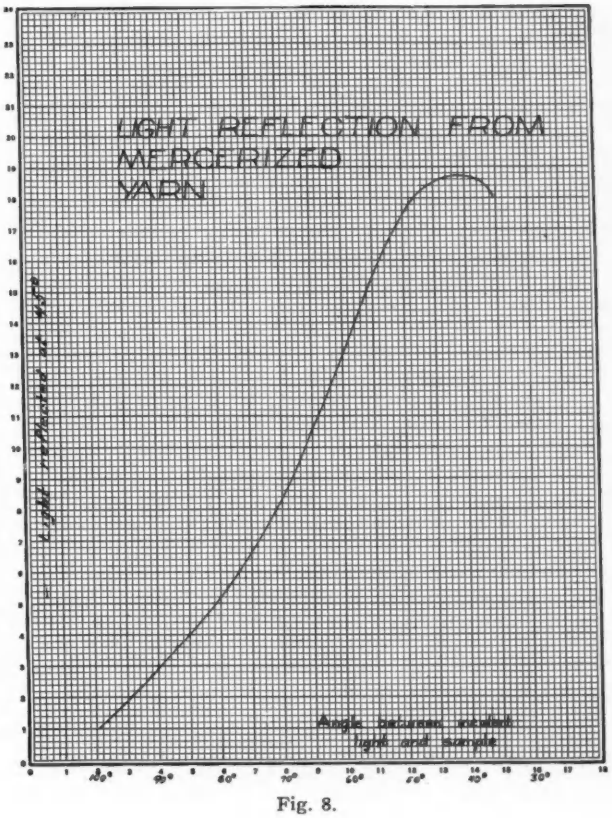


Fig. 8.

Other samples of mercerized yarn having different lusters but the same construction give curves of similar shape. It has also been found that these samples of mercerized yarn showing the greatest luster as seen visually have the highest ratio for the amount of light reflected when illuminated at 45 degrees to the amount of light reflected when illuminated at 90 degrees. This ratio has been used as a numerical measure of the luster of such yarns and has been of value in checking visual gradings.

A single ratio cannot be used however to compare the luster of one type of mercerized yarn with a yarn of greatly different construction or with fabrics as the light reflection curves of these different materials would not have the same shape.

In addition to being of value in obtaining relative luster values for materials of the same construction, this instrument should prove of value in determining the relation-

ships of the factors which go to make up the luster of mercerized yarns and fabrics as seen visually.

We wish to express our appreciation to W. D. Appel and R. S. Hunter of the National Bureau of Standards and to H. Ranson of the University of Chattanooga for their assistance in the work on luster.

REFERENCES
[1]Am. Dyestuff Reptr. *25*, 186-190 (1936).
[2]Am. Dyestuff Reptr. *25*, 458-466 (1936).
[3-4]Reports to be published in Am. Dyestuff Reptr.
[5]J. Text. Inst. *15*, T195-T206 (1924).
[6]Textile World *66*, 1569-71 (1924).
[7]Trans. Faraday Soc. *20*, 240-250 (1925).
[8]Dyer Calico Printer *64*, 515-7, 583-5 (1930).
[9]Monats. Textil. Ind. *49*, 63-4, 87-9, 109-10 (1934).

Fundamental

Properties of Starches*

G. V. CAESAR†

THE study of starch has suffered heavily from a faulty approach. The literature is replete with misleading confusing statements, and half-truths. Much of this has come about through a neglect of the physical aspects of questions relating to starch. The science has been approached too much from a strictly chemical angle. Certain early European investigators, of whom Samec is an outstanding example, have treated starch from a colloid chemist's point of view, and their influence has colored the work of other investigations to an extraordinary and most unfortunate extent. It was Samec who so popularized the conception of "amylopectin", the so-called non-dispersable fraction of starch, that the term has literally "run amok" among the literature, in the main without either understanding or definition.

To the late T. C. Taylor of Columbia University unquestionably belongs the leadership in establishing a correct approach to the scientific study of starch and dextrin. He recognized, more clearly perhaps than anyone, that starch, as nature produces it, is a very highly organized physical entity; that it cannot be treated as if it were, substantially, a molecule $(C_6H_{10}O_5)_n$, but must be worked upon from the point of view that it is an highly associated complex of molecules (micelles) organized into the familiar microscopic granular form. It follows that this associated aggregate must be thoroughly dissociated before amylopectin, or better still "alpha amylose", can be accurately determined and understood; and that the same prerequisite should also apply to studies of starch substitution products, such as methylated starch and the starch esters. In other words, starch, in the form that it is ordinarily used for chemical studies, may vary so widely in its physical state of organization, from one investigator to another, as to yield very confusing and contradictory results. A true picture of the granular organization should precede all chemical studies, if they are to be significant.

Samec's studies of alpha amylose (amylopectin) in potato starch (we will see later that little or none actually is present in potato) lent weight to a basic mis-conception that alpha amylose forms substantially the *outer* layers or skin of the starch granule, the so-called "soluble" beta amylose comprising in the main the interior of the granular sack. This hypothesis is widely accepted and tenaciously affirmed. It is extremely plausible and is apparently confirmed by microscopic examinations. Nevertheless there are the strongest indications that it is not so, one of them being that electrophoresis tests on these outer skins or granule shells (Taylor's method) yielded proportions of alpha and beta amylose substantially the same as from the original granule. The phenomena of tough water-resistant shells, as observed in a starch paste, is probably caused by a closer packing of the starch micellar building blocks in the outside layers of the granule with a correspondingly increased resistance to hydration and subsequent dispersion. A relatively loose packing or state of aggregation of the micellar building blocks in the interior of the granule would account for the "spilling-out" and ready dispersion there observed.

Taylor was unable to find more than a trace of alpha in potato starch. The large and variable amounts claimed by Samec and others appear to have consisted of associated beta, potato starch being particularly difficult to disorganize: The molecules are probably longer than in the cereal starches; fatty acid residues are absent; and hence the aggregate associative valence forces of the chain molecules are greater.

Mere retrograded starch is often mistaken for alpha-amylose. The first question which should be put to any

*Presented at Saturday morning session, Annual Meeting, Providence, R. I., Dec. 5, 1936.

†Laboratory Director, Stein, Hall & Co., Inc.

enthusiast who claims he has produced "amylopectin," is: "how do you know it and how do you define it"? It is not unlikely that there may be no such chemical entity as alpha amylose (amylopectin); and that the non-dispersing (insoluble) properties in water so tenaciously exhibited by alpha (when prepared by a competent investigator) may be caused by the presence of hydrophobic non-amylaceous impurities, such as the fatty acids, oleic, linolic, and palmitic. It is significant in this connection that these acids are characteristic of the cereal starches, such as corn, and to a less extent of tapioca, but that in potato starch the non-amylaceous residues are confined to the hydrophillic substance, phosphoric acid. Taylor has proved that the non-dispersable fraction (alpha amylose, if you will) is lacking in potato starch. The indications drawn from gelatinizing data obtained through our laboratory's Consistometer research, tend also to strengthen this suspicion that alpha amylose is not a true chemical entity but may derive its physical peculiarities from association with fatty acids. Taylor has in fact already proved that defatted alpha and retrograded beta amyloses are apparently identical.

The most important and characteristic property of starch is its swelling or pasting properties in water. Influences affecting the physical organization of the granule become predominant when once gelatinization is under way. Among these, rate of heating and degree and duration of applied mechanical stresses (such as agitation) are very important. It is impossible adequately to cover this subject in the space of this address, but for those who are interested, I refer to two papers by this laboratory, published in Industrial & Engineering Chemistry, viz., 24, 1432 (Dec.) 1932; and 27, 1447 (Dec.) 1935. The following lantern slides were in the main prepared from Consistometer studies described in the second of these papers.

ONE HUNDRED AND THIRD MEETING, RESEARCH COMMITTEE

THE 103rd meeting of the Research Committee followed the Council meeting in Providence on Friday afternoon, Dec. 4, 1936. Present were Chairman Louis A. Olney presiding, W. D. Appel, K. H. Barnard, E. C. Bertolet, J. R. Bonnar, W. H. Cady, Hugh Christison, H. D. Clayton, R. E. Derby, C. Z. Draves, Alban Eavenson, C. L. Eddy, S. M. Edelstein, A. H. Gaede, S. N. Glarum, Milton Harris, H. F. Herrmann, A. E. Hirst, A. P. Howes, C. A. Jones, E. H. Killheffer, H. W. Leitch, J. G. Masson, Hans Meyer, W. R. Moorhouse, G. A. Moran, R. M. Ritter, R. E. Rose, B. A. Ryberg, W. M. Scott, H. D. Smith, T. R. Smith, A. R. Thompson Jr., Ben Verity, R. S. Wheeler, W. S. Williams, and H. C. Chapin, Secretary.

Sidney M. Edelstein reported on his work under the Mercerizing Committee, of which Harold Schroeder is now Chairman. Sivert N. Glarum reported on the progress of his work on Vat Printing Pastes, and Bertil A. Ryberg on his development of methods of Determining Extraneous Matter in Textile Materials. Alban Eavenson and Milton Harris summarized the work and publications to date of Dr. Harris and his associates in Washington.

Harold DeWitt Smith outlined the plans of the new committee on Chemistry of Cellulosic Fibers, of which he is Chairman. William D. Appel presented a series of samples resulting from recent comparison, at the Bureau of Standards, of the light fastness standards of this Association with those from England and Germany. George A. Moran submitted a report on comparison of foreign, dyed cotton fastness-to-washing tests, with those of this Association. E. C. Bertolet reported that his committee on Fastness to Perspiration was working on a milder, compromise method. Kenneth H. Barnard named the members appointed to his committeee on Crease Resistance and Permanence of Finishes.

The Chairman of the Research Committee stated that by the next meeting it must be decided which provisional test methods are to be reported as accepted methods in the next Year Book of the Association. Walter M. Scott invited criticism of the revised Analytical Methods published by his committee in the 1935-6 Year Book. He called attention to a recent publication of the American Society for Testing Materials Committee on Water Analysis, on which he is serving as representative of this Association.

Respectfully submitted,
HAROLD CHAPIN, *Secretary.*

ONE HUNDRED AND TENTH COUNCIL MEETING

THE Council held its 110th meeting in the Biltmore Hotel, Providence, on Friday afternoon Dec. 4, 1936. Present were President William H. Cady, presiding; Arthur R. Thompson, Jr. and Elmer C. Bertolet, Vice Presidents; William R. Moorhouse, Treasurer; Louis A. Olney, Chairman of the Research Committee; E. H. Killheffer and Robert E. Rose, Past Presidents; Carl Z. Draves, Henry F. Herrmann and Arthur E. Hirst, Councilors-at-Large; Roland E. Derby, Ben Verity, Hans Meyer, R. M. Ritter, Chester L. Eddy, R. S. Wheeler, and C. A. Jones representing their Sections; and Harold C. Chapin, Secretary. The Treasurer's report of Oct. 31, and the Secretary's balance sheet attached hereto, were accepted.

Upon recommendation of Philadelphia representatives it was voted that the next Annual Meeting, in Philadelphia, be in December, 1937. On behalf of the Southeastern Section Professor Jones extended an invitation to

Secretary's Balance Sheet—November 30, 1936

	Applications	*Dues, regular and reinstate*	*Dues, Corp. and Sustaining*	*Miscellaneous*	*Bank charges*	*Totals*
Received by Secretary, Nov. 1, 1935, to Oct. 13, 1936.....	$1,202.50	$7,017.85	$2,275.00	$940.35	—$3.07	$11,432.63
Received by Secretary, Oct. 13 to Oct. 31, 1936.....	95.00	56.25	.....	44.61*	.....	195.86
Total received and transmitted to Treasurer in fiscal year	1,297.50	7,074.10	2,275.00	984.96	— 3.07	11,628.49
Received by Secretary, Nov. 1 to 30, 1936.....	280.00	4,252.95	1,670.00	38.15**	— .25	6,240.85
Transmitted to Treasurer.....	275.00	3,947.80	1,660.00	34.40	—	5,917.20
Leaving to order of Secretary..	5.00	305.15	10.00	3.75	— .25	323.65

MISCELLANEOUS ITEMS:*		MISCELLANEOUS ITEMS**	
Year Books	$ 5.00	Year Books	$17.75
Dyed standards	8.00	Dyed standards	7.00
Dyestuff Reporter	.35	Dyestuff Reporters	3.75
Crock Meters	31.26	Worsted tubing	9.65
Total	$44.61	Total	$38.15

the Association to hold its next following meeting in Atlanta. In order that the Southeastern Section might for the first time entertain the Association in an Annual Meeting, Mr. Thomas R. Smith, Chairman of the Piedmont Section, withdrew the invitation previously extended by his Section. It was therefore voted that the Annual Meeting in December, 1938, or spring of 1939, be in Atlanta.

It was voted that the President appoint a committee to recommend comprehensive rewording of the Constitution to accord with present needs and practice. Prices for Year Book advertising were approved. Harold C. Chapin was elected Secretary. Continued employment of Dr. Glarum's assistant until the next Council meeting was approved. Boston was chosen for the next meeting of the Council, on the morning of Jan. 29 or Feb. 5. For the Council meeting on the morning of April 17 the place was changed to Greensboro, to accord with the meeting of the Piedmont Section.

Organization of a Philadelphia Textile School Student Section was approved. To Corporate membership were elected General Dyestuff Corporation, Etablissements Kuhlmann and Merck & Co. Each of the following was elected to the class of membership specified, as of thirty days from publication of application, provided no objection be received meanwhile by the Secretary.

Active

W. H. Adams	H. C. Hennig	E. H. Roedel
A. G. Alexander	H. F. Holmes	Jos. Schmitz, Jr.
H. C. Brooke	P. W. Kase	J. T. Scoon
E. K. Bush	A. F. Kittredge, Jr.	A. L. Smith
C. F. Chace	J. M. Lowe	F. N. Spoerl
D. A. Cook	J. F. McCoy	Thomas Toppin
W. G. Diamond	T. J. McDonald	A. W. Vint
John H. Dulin	J. L. McEwen	T. H. Walker
S. W. Freeman	E. E. Miles	Eric Weigman
R. D. Greene	Alfred Muir, Jr.	Fred Whittaker
E. C. Gruetsmacher	J. N. Parker	F. R. Wilson
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E. M. Eddington	G. E. Merrick	J. L. Waldo
N. F. Getchell		

H. P. Goller, Geo. Schultz McCarty and H. W. Tetzlaff were transferred to Active membership.

Respectfully submitted,

HAROLD C. CHAPIN, *Secretary.*

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UNEMPLOYMENT REGISTER

Members of this association, who are without employment, should forward to the secretary a statement as to their qualifications and experience. This information will subsequently appear on these pages with an identifying key number. Employers are also requested to file with the secretary or the American Dyestuff Reporter any vacancies which may occur in their businesses.—H. C. Chapin, Secretary, Lowell Textile Institute, Lowell, Mass.

Key: A—Laboratory and research; B—Dyeing or printing; C—Finishing; D—Sales; E—Instruction; F—Executive.

NOTE: PERSONS WHO HAVE OBTAINED EMPLOYMENT SHOULD NOTIFY THE SECRETARY OR THE AMERICAN DYESTUFF REPORTER AT ONCE.

Prospective employers may file vacancies either with the secretary or the American Dyestuff Reporter.

Note: The following are additional listings. Others appear on page P730, Dec. 28, 1936 issue.

A-B-C-3

Education—Graduate, Chemistry and Dyeing Course, Lowell Textile Institute, 1934.

Experience—Has experience as chemist; dyer of union knit goods (cotton and woolen); experienced bleacher on both. Has handled Tube-Tex processing on cotton and rayons. Single; will go anywhere.

B-4

Experience—Foreman dyer in charge of ribbon dyeing for 20 years. Experienced on silk, cotton, rayon, acetate yarn. Age 41; will go anywhere.

AMERICAN
DYESTUFF
REPORTER

LOUIS A. OLNEY, Sc.D.
Professor of Chemistry and Dyeing, Lowell Textile Institute
Directing Editor

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MORE ON GETTING ALONG WITH PEOPLE—V

You and Your Boss

I CAN'T tell you what your boss wants in the men that come under his supervision. Probably he can't either but he knows when he has a good man. Nor can I give you any rules for getting along with unreasonable executives, for there are such, some who seem purposely to be unreasonable, and some who seem naturally to be that way and probably cannot help it. However, there are things to think about besides mere efficiency in doing routine work and following ordinary instructions.

If you are not too new at the business it is quite possible that you know more about some things than your immediate superiors and tact may be required in employing this knowledge.

A foreman or executive who is not sure of himself often tries to bluff it out, or perhaps to cover up for his own benefit by being over-dictatorial. He may then succeed best in arousing just the sort of opposition that he ought to try to avoid. Usually the executive who is a cooperator gets along much better. This does not mean that he should not be direct and forceful where it is necessary. One must learn to distinguish between such types in the men with whom he has to deal.

Frequently, and in fact most usually, a man in authority knows well enough that his knowledge is greatly lacking but frequently he does not feel free to admit it. He would be glad enough to find out but is likely to become quite resentful at being told. Isn't he supposed to know his own business? But, he is quite conscious that he does not to the extent that he would like to.

If you don't look out you are likely to find yourself in this sort of a position—wanting to know, but not wanting to be told. Actually it is just plain silly, but there are plenty of people who seem to prefer not to learn rather than to be told. First, don't be like that. Get over the inclination to such irrational resentment. Second, learn to spot that attitude in others and watch out. It is a part of tact to withhold from our friends on certain occasions information which we know would be good for them but which they do not want to learn from us. The only thing to do is to get at it in some other way.

It is not so bad to question or criticize an individual on something that he has worked on and thought about, and upon which he has reached a reasoned conclusion. There is evidence, a basis for discussion. But suppose you attack a prejudice, of which we all have plenty. By definition it is not based on much of anything; there are no real reasons for it and of course you are in trouble. Notice when one of yours is questioned. If you can think, and have a little sense of humor you can see the point and see the value of being a bit tolerant.

If a superior wants an experiment give him a real experiment, not a perfunctory one. Many times the answer to such a request is to do just enough to say that it was tried and to report that it didn't work. There is a tendency to regard the new ideas of a non-technical executive or salesman as impractical if not foolish. But, I saw a suggestion on finishing yarn made by a general manager without technical education work out better than various suggestions from a research department; and a salesman's suggestion corrected a defect in a fabric design which had eluded the technical men at the mill.

It is rather risky to predict that a new thing will not work, in these days when so many of the supposed impossible things are already being done. Most suggestions from non-technical people probably will not work but occasional ones do and you cannot afford to miss them. Give careful thought to the impossible or foolish suggestion and if you make an experiment try to make it work. You may be surprised at the result.

Incidentally the best way to succeed with your superior is to do the things that he wants in just the way he wants them done. You may think you know better, but perhaps you don't. Do not change the instructions unless you are very sure. If you question what is requested there is no harm in finding out whether a change will be acceptable. If not perhaps you can contrive to try it in your own way too. If you happen to come out better you may have another problem in presenting the result.

Some men would immediately accept your result and be glad to get it. Others would be resentful that you "interfered" and that would be more important to them than the result itself. In such a case you do not want to appear smarter than the boss so perhaps you can present your experiment as the next logical step to his basic idea, and explain that you went ahead and took it and got just what he wanted.

If an experiment for another person is a failure it may be wise to apply a little face-saving. You may want to show your appreciation that the thought behind the experiment was entirely plausible but that there were mis-

leading things about it that nobody could have foreseen.

To some extent it is true of everybody that self preservation is the first law of nature. We try to avoid showing our own mistakes or appearing in an unfavorable light. This is also a reason for not showing up other people and their mistakes in a conspicuous way. It does not pay to run to the management and claim that somebody else is all wrong. Usually you do not want to appear to be seeking favor on the basis of somebody else's mistakes. If the error has to be pointed out consider trying to get the one who is making the mistake to correct it of his own accord so that it will not be necessary to make him appear in an unfavorable light. If that does not work or fit the circumstances it may have to be reported.

Getting along with people in the more general sense is largely the cultivation of personal favor. While that is not at all the point of this discussion, which is being based as far as possible on purely technical grounds, the personal element cannot very well be avoided. It intrudes along with technical efficiency, and personal liking naturally helps you get ahead.

Your boss may not be the aloof creature that he seems, who cannot be bothered. More than likely he will like to be asked for help and advice—at suitable times of course. Most people like to explain things in which they are particularly interested or upon which they are well informed.

Do not hesitate to refer your new idea to his judgment. Deferring to his opinion in itself invites agreement with your proposal, if you do it right, rather than opposition.

Frequently you can make suggestions to good advantage by asking questions whose answers suggest what you propose to do. Planting a good suggestion in this way may be far more effective than trying to implant it by a more direct approach. In this way it may become the other man's suggestion but what does it matter if you get what you want? Remember that people like to discover ideas and form policies for themselves (or to think that they do).

If You are Boss

If you are boss simply turn many of the things that have been said around and look at the other side. They are completely reversible and work both ways.

If you are in charge of the work of other people you must assume responsibility for it or you are no executive. Don't explain your troubles by saying that So-and-so did something wrong. It was your job to see that it was done right. Complain until you get satisfactory help and then do not duck responsibility for proper performance by the excuse that someone else was wrong. I have always insisted on not having to explain for people under me. If they have had a fair chance and keep getting you into trouble, make some other arrangement.

There is often a temptation to pass things off in order to avoid responsibility or to avoid hurting somebody's feelings, but in general it does not pay to "pass the buck" in this way either, for this simple way out may stamp you in the minds of other people as avoiding responsibility and the true functions of an executive. I have certainly formed such opinions in such circumstances of other people who were supposed to be executives.

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The Steam Accumulator

(Continued from page 28)

dotted line the steam consumption with the accumulator cut out. In the latter case, although 12% more boiler-heating surface was in operation, the peak loads were not adequately met, as indicated by the shaded areas.

Fig. 4 shows the influence of the accumulator on the pressure in the high-pressure main and indicates its important equalizing effect. In this particular instance, the maintenance of constant pressure at the engine stop valve enabled an increase in power output from 650 to 850 kW to be obtained, yielding a saving of 200 kW in power purchased from an outside source.

These curves very clearly demonstrate the value of the accumulator as a means of leveling up periods of low load and periods of peak load and of making plant steam consumption absolutely independent of the rate at which the steam is generated. This is the most important function of the steam accumulator.

The management of this particular mill stated that, as a result of installing the accumulator, the quality of the finished product was considerably improved, while the shortening of the period required for the heating up of the dye kettles resulted in an increased output of finished material exceeding 10%. This by no means represents the limit in this direction, as in many textile mills where accumulators have been installed a much greater increase has been recorded.

In a mill equipped with an accumulator, the required quantity of heat used need not be generated to suit the instantaneous demand, but is available as stored energy ready for use at any time. This is the secret of an un-

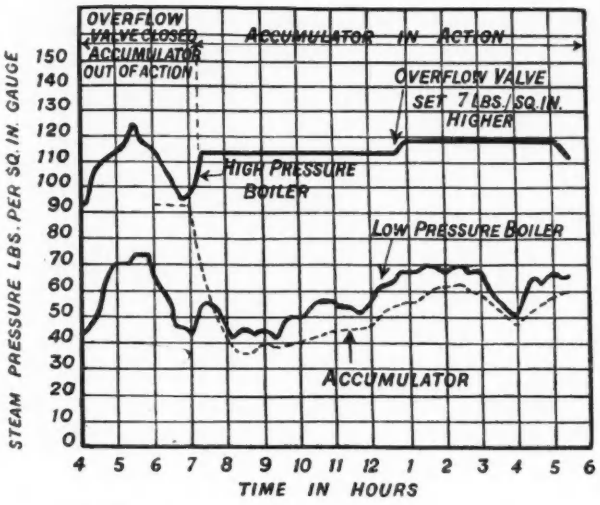

Fig. 4. Influence of Accumulator on Pressure in High-Pressure Main.

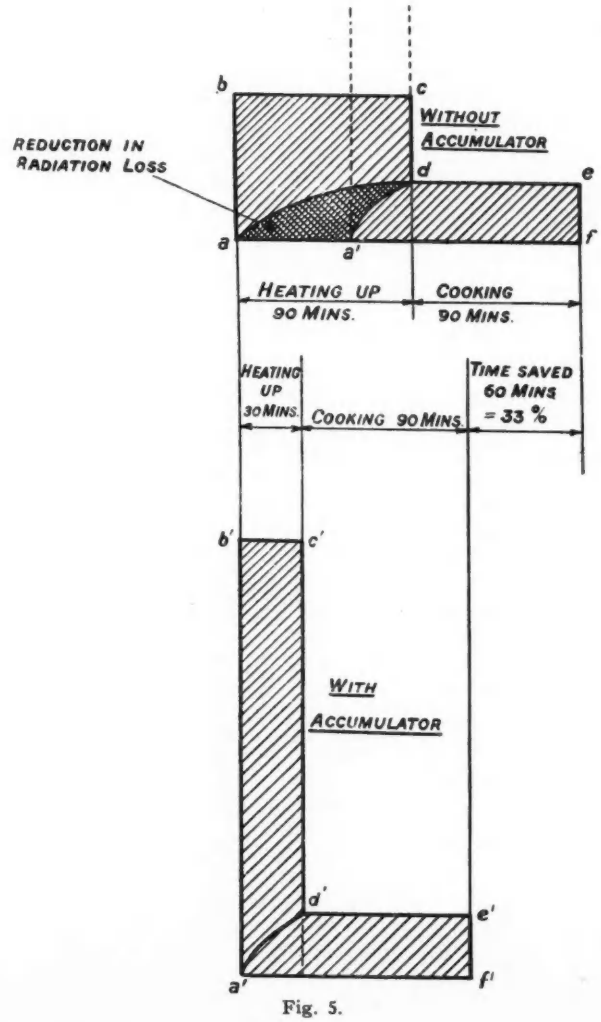

Fig. 5.

restrained manufacturing process. In the ordinary way, a delicate process, involving the use of costly machinery, is entirely at the mercy of the boiler-house staff, who have no intimate knowledge of the process and whose one aim is to conserve coal. With the accumulator, the manufacturing plant is automatically and instantaneously served with steam of the precise quality required. This has an enormous effect both on the quality and quantity of production, a point which may be discussed further with advantage. In the textile industry the operation of a dye kettle serves as an excellent example. Conditions as they relate to the dye-house in the plant above described are represented in Fig. 5.

Without the accumulator, the time taken to raise the temperature in the kettle to boiling point was 1½ hours. The steam required for this purpose corresponds to the surface a b c d a. During the starting up and after the boiling point is reached, steam must be supplied to the kettle to take care of the radiation losses corresponding in the diagram to the surface a d e f a. After the installation of the accumulator, it was possible to start up the dye kettle to boiling point in 30 minutes without causing any trouble in the boiler-house. The steam required for heating up corresponds to surface a' b' c' d' a' and the radiation losses to a' d' e' f' a'.

From the diagram it will be observed that, by means of the accumulator, the time required for starting up the dye kettle was reduced from 90 to 30 minutes, corresponding to a 50 per cent. increase in the production of this part of the plant. Further it will be seen that the radiation losses after the accumulator had been installed were reduced by an amount corresponding to the surface a d a' a.

The above example will serve to illustrate the importance of the accumulator wherever steam is required for heating and conditioning. In many industries employing steam for such purposes the installation of an accumulator has been responsible not only for increasing the output up to 50%, but also for reducing the steam consumption from 10% to 20% by shortening the time required to complete the operation and thus reducing the loss of heat by radiation.

PATENTS RE CALENDER TREATMENT

OUR attention has been called to the fact that the process described for rendering calender treatment substantially permanent, on page 654 of the November 30th, 1936 issue, in the article entitled "One Year of Textile Processing in England" is the subject of patents in most manufacturing countries, the patent rights being held by the Calico Printers' Association, Ltd., and Messrs. Raduner & Co., A.G., of Horn, Switzerland. It is probable that this process is subject to patents in other countries as well.

TRADE NOTES — NEW PRODUCTS

• NEW YORK ALUMNI, L.T.I.

A meeting of the New York Chapter of the Lowell Textile Institute Alumni Association was held on Wednesday evening, December 2nd, 1936 at the Old Timers' Grill. Arthur A. Stewart, '00, head of the department of wool finishing at the Institute and secretary of the Alumni Association was guest speaker and he brought to attention the banquet-meeting which was held on December 12th at the University Club in Boston.

• BOSTON MEETING, L.T.I. ALUMNI

A banquet-meeting of the Lowell Textile Institute Alumni Association was held on Saturday evening, December 12th, 1936 at the University Club in Boston. Nearly 300 members and guests attended.

Members of the Board of Trustees who attended as guests were as follows: Chairman John A. Calnin, Mayor Dewey G. Archambault, Vice-chairman Philip L. Scannell, John A. Connor, Vincent M. McCartin, James H. Riley, John E. Regan and Charles C. Schloss of Lowell; Thomas T. Clark of North Billerica; John H. Corcoran of Cambridge; John C. Carr of Boston and Stanley H. Wheelock of Uxbridge.

Among the speakers were John A. Calnin for the board of trustees, Mayor Archambault of the city of Lowell, Charles H. Eames, president of the Institute and Franklin W. Hobbs, president of the Arlington Mills and one of the two living members of the school's first board of trustees. Harold W. Leitch, '14, president of the Alumni Association extended a welcome to those present and introduced Herbert A. Currier, '06, who presided as toastmaster.

In his remarks Mayor Archambault stated that Lowell, hardest hit of all Massachusetts cities during the depression, can again look forward to a semblance of plain sailing. He indicated that the success of Lowell is closely allied with the Institute and that the city is justly proud of the positions which graduates hold in the textile world today. Mr. Hobbs spoke upon research activities and referred to the expansion of courses and the successful competition of graduates with those of other technological schools and colleges and said that the activities of the members of the alumni have assisted greatly in broadening the scope of the school. He also expressed the appreciation of the Textile Foundation, of which he is chairman of the board of trustees, for the work which had been done under the auspices of the A. A. T. C. C. at the Institute. Mr. Calnin, in his remarks, brought out the fact that Lowell Textile Institute had won an enviable reputation through the positions which its graduates have held and are holding today in the industrial field. He praised those men whose vision and courage were responsible for the establishment of the institute and for its steady growth. President Eames dwelt mainly on the history and development of the Institute and also praised the members of the faculty not only for their work among the students but also for the work which they have done in the development of processes of various types in doing research work for the industry itself.

• ADDRESSES NEW BEDFORD STUDENTS

James A. Branegan, president of the Kali Manufacturing Co., 1410 N. Front St., Philadelphia, Pa., addressed the chemistry students of the New Bedford Textile School on Wednesday morning, January 13th, speaking mainly on the compound formaldehyde. After outlining its uses in the past, Mr. Branegan enlarged on its current development and its future possibilities.

A diagram drawn on the board with a complete oral explanation accompanying it gave the students a definite idea of the formation of formaldehyde and urea which compounds, when mixed together, form a synthetic resin. Also included in the talk was the manner of shipping formaldehyde, the amount manufactured yearly, its uses, its effect on fabric, etc. He concluded his talk by answering the questions which were presented by the students.

Mr. Walker, principal of the school, thanked Mr. Branegan on behalf of the student body and expressed the hope that sometime in the future the speaker would again address them.

• JOINS NOPCO

Donald Price, Ph.D. has joined the National Oil Products Company research staff. He is well known for his work in synthetic organic chemistry and microanalysis, especially his contributions to the chemistry of the Methoxychalcones and Methoxybenzalcoumaraones and cycloparaffins. For a number of years Dr. Price was a member of the Columbia University faculty where in 1930 he received his doctorate and shortly afterward directed his efforts to industrial problems.

Dr. Price has had an exceptionally broad training both in this country and abroad having worked in collaboration with Prof. T. M. Lowry in England and Prof. K. Fajans in Germany. He also studied organic micro-analysis in the laboratory of the late Prof. Fritz Pregl in Austria. Dr. Price has published a number of interesting papers. He is a member of the American Chemical Society, The American Association for the Advancement of Science and a Fellow of the Chemical Society (London).

Dr. Donald Price

Nopco's research laboratories will afford Dr. Price ample opportunity to combine both his academic and industrial experience in the solution of industrial problems and the development of new products for the company.

• NATIONAL RELEASE

National Aniline & Chemical Co., 40 Rector St., New York, N. Y., announces release of a bulletin describing the following product:—

National Carbanthrene Red Brown R Double Paste—an addition to the National line of anthraquinone vat dyes which produces reddish brown shades said to be of good fastness to sunlight, very good fastness to sea water, washing, perspiration and alkali, and excellent fastness to cross dyeing and water. It is stated that it reduces readily, levels well and is suitable for use in open tubs or machines. It may be used in combination with such colors as National Carbanthrene Olive R Double Paste, National Carbanthrene Khaki 2 G Paste or National Carbanthrene A G Double Paste to produce varying shades of brown said to be of very good all around fastness on cotton, rayon or linen. Bulletin No. 210.

• ACQUIRES CHAS. H. STONE, INC.

American Cyanamid & Chemical Corp. announces the acquisition of the business and plant of Chas. H. Stone, Inc., of Charlotte, N. C. Its operations will be merged with those of Cyanamid's Southern District. It is stated that the increase in warehouse and production facilities in the South, on the one hand, combined with a more comprehensive range of chemicals and allied materials together with extensive research facilities, are now placed at the disposal of the customers of both organizations.

Charles H. Stone

The Charlotte District will be under the direction of Paul F. Haddock, Southern Sales Manager, and Chas. H. Stone, Charlotte District Production Manager.

Paul F. Haddock

The Charlotte Office will be transferred to and the business of the Southern District conducted from 822 West Morehead Street, Charlotte, N. C. The company requests that all orders, inquiries and correspondence be directed to P. O. Box 1067. Telephone numbers are Charlotte 6129 and 3-4115; long distance 942 and 981. The Greensboro, N. C. warehouse will be continued at 125 Walker Ave. and the Greenville, S. C. warehouse at 409 Westfield Street.

• SONNEBORN RELEASES

L. Sonneborn Sons, Inc., 88 Lexington Ave., New York, N. Y., announces release of the following products:—

Raythro (*Patent Pending*)—a wholly combined unit for use in the processing of rayon yarn for crepe filling developed some time ago by the Sonneborn Research Laboratories. The manufacturers claim that Raythro (patent pending) is sufficiently flexible to effectively replace older types of throwing materials. According to Sonneborn's laboratories it possesses unusual adhesive properties, is easily rinsed out and is non-oxidizing.

Sanforol—a specialty developed for use in denim finishing, both sanforized and unsanforized. According to the manufacturers Sanforol is a finely balanced sulfonated castor oil, possesses a high bound SO_3, is non-foaming in varying starch mixtures and contains an effective deodorant to prevent oxidation. It is further said to be lime-proof as well as acid proof and, because of an entirely new method of sulfonation, to be highly preferred for its lightness in color.

• QUARTERLY PRICE LIST

The quarterly Price List for January, 1937 of the R & H Chemicals Dept. of E. I. duPont deNemours & Co., Wilmington, Del. has just been released. Among the items of current interest for textiles receiving special attention in this issue is sodium perborate for textile bleaching. It is claimed that the perborate bleach is safe and economical for all types of textile fibers and fabrics. It is said to be particularly suitable for bleaching knit goods and cotton package yarns. It is stated that it produces a full bleach with remarkable softness or an even, clear half-bleach for dye bottoms. It is further claimed that sodium perborate is easy to handle, convenient to use, saves bleaching time and simplifies the processing and finishing.

Also receiving special mention in this issue is a sound film entitled "Wonder World of Chemistry" which tells the story of man-made rubber, manufacture of dyes from coal tar, plastics and rayon from cotton, and other outstanding chemical achievements. Prints of this film will be loaned free to business and educational groups. Inquiries should be made to the R & H district offices.

• ONE-HUNDREDTH CHRISTMAS

The Procter & Gamble Co. celebrated its 100th Christmas by the distribution of a holiday greeting card which traced briefly the growth of the company from the time of the birth of its founders up to the Christmas of 1936. We learn that William Procter and James Gamble entered into partnership in the summer of 1837, with the articles of agreement bearing the date of October 31, 1837. The Procter and Gamble Company was incorporated in 1890 under the laws of New Jersey and William A. Procter, son of one of the founders became the first president. The company was re-incorporated under the laws of Ohio in 1905. In 1907 William A. Procter died and his son, William C. Procter became president. In 1930 William C. Procter resigned as president and became chairman of the Board of Directors. He was succeeded by Richard R. Deupree, the present head of the business. William C. Procter died in May of 1934.

• HOUGHTON RELEASE

E. F. Houghton & Co., 240 West Somerset St., Philadelphia, Pa., announce the release of the following products:

Raylubric Compounds—The Houghton Company claims that Raylubric pebble control answers a need that has long confronted the rayon industry, namely, to obtain a definite, uniform, controllable degree of pebble in finished rayon fabrics without changing delicate mechanical adjustments and yet achieving the same results through soaking of the crepe filling yarn. Raylubric P C offers three definite variations in the pebble produced. Raylubric P C 1 is said to produce a fine pebble and is a stiff, firm greyish colored jell soluble in hot water. Raylubric P C 2 is said to produce a medium pebble and is a soft, straw colored paste soluble in hot water. Raylubric P C 3 is said to produce a heavy pebble and is a liquid at room temperatures, dissolving in hot water to make a milky white emulsion. It is also stated that these products are economical and easy to handle. When used according to instructions it is claimed that there is no danger of variation in the degree of pebble produced.

• TEXTILE DRYING RESEARCH

Only fourteen additional subscribers at $100 each, or a total of $1,400, are needed at this writing to complete the first year's financing of the research on textile drying. This project is being wholly financed by U. S. Institute for Textile Research, and a total of $5,000 must be subscribed by 50 co-operators before the administration committee (W. E. Emley, chairman, Alban Eavenson and H. DeW. Smith) can complete its organization, and

recommend to the Research Council and the Executive Committee the place, director and personnel for the study. Those who may be hesitating to subscribe until the latter facts are decided should know that they are delaying unnecessarily the completion of the financing and the starting of research work. Cooperators will have the same opportunity to express their preferences that was given to co-operators in the warp sizing study. They should realize also that the number of mills and allied interests required to complete this financing is double the number which financed the warp sizing study, and that the number of contributing members of U. S. Institute who will qualify to receive the confidential progress reports of the drying project will be considerably over 100. Those who are coming in eventually for the latter can help most by coming in now and being listed among those who are making the study possible. —*January Textile Research.*

• SOLVING UNEMPLOYMENT

The question is "How far can industry go in reducing unemployment by any reasonable means at its command?" It has been pointed out that the work week in 1933 was about 43 hours, that this figure dropped to 34 hours in 1934, and has since increased to just under 40 hours per week today. It is then argued that by reducing hours about 10 per cent from 40 hours to 35 hours per week, employment in industry would be brought back to its 1929 level. Granting for the moment that this may be true, it then follows that weekly wages now paid to 8,000,000 persons would have to be scaled down 10 per cent so that 9,000,000 persons could share in the same wage fund. The alternative would be a 10 per cent increase in prices to accommodate increased wages for the additional 1,000,000 persons to be employed at the going-wage rates.

There would be severe administrative problems brought up in business by introducing a shorter work week. Someone has pointed out that a thirty-hour week would barely give a worker time to get his coat off before the whistle blew for stopping work. At one extreme of the scale, a sixty-hour week is too long for industry as a whole; yet on the other hand, a ten-hour week today would be foolish. Somewhere between these extreme limits lies the optimum length of work week.

We are not prepared to indicate the proper answer to this problem. But we can point out with clarity that talk of "industry absorbing the unemployed" is a problem not only of manufacturing industry increasing its employment, but also of all other types of employers increasing their employment too.—*Rayon Organon.*

OPEN FORUM

Rules under which this department of the REPORTER is conducted are as follows:

1. Anyone who has a technical problem on which he would like advice may submit it to the Reporter and it will be published in the first available issue.

2. Any reader who feels that he has a solution of the problem may forward his reply to us and if we feel that the reply is suitable it will be published in a succeeding issue.

3. For each such reply published the Reporter will pay a minimum of $2.

4. In case there is more than one answer to the same question, the one covering the subject in the most complete and authentic manner will be published, or if two answers are sufficiently different both will be published. If two answers are considered equally good, the one first received will be given priority.

5. The Reporter will assume no responsibility whatsoever for the accuracy of the answers submitted—it is simply offering a vehicle for the public expression of its readers' opinions.

6. Both the questioner and answerer must send in his complete name and address. When requested we will publish only the initials or other identifying insignia.

New Question

39—Can a worsted yarn be produced in a maroon shade that will be fast to sun, fast to salt water, and fast to crocking? We can produce a maroon that is fast to sun and salt water but it crocks. On the other hand we can eliminate the crocking but we sacrifice either fastness to sun, or salt water. The yarn is for bathing suits.

The stock we use in making the yarn is slub or tub dyed. After dyeing it is run through a back washer. We have tried all types of dyestuffs that will give us fastness to sun and salt water, but they all crock on a rubbing test. In many cases however the color will not run when wet which seems to be the mystery. Would it be possible that the dry crocking is due to excessive dyestuff left in the stock? If so, we do not seem to get it out even though we are using five bowls in back washing.

Information or suggestions will be appreciated.—**E. D. H.**

CLASSIFIED

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

WANTED:—Nationally prominent refiner and manufacturer of fiber lubricants and emulsions for mohair, worsteds, wool, merino, rayon and carpet yarns has unusual opportunity for successful sales representative to cover state of Pennsylvania. Salary or commission basis. Write in detail training, experience, record of sales past five years, age, references, etc. Box No. 937, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

EXECUTIVE—PURCHASING AGENT is available for organization requiring an executive having initiative, foresight and tact in handling large contracts, inventories and turnover. Has excellent record for constructive economies. Write Box No. 938, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

POSITION WANTED: CHEMIST-SUPERINTENDENT—Seventeen years experience, all branches of Textile Processing. 32 years of age, married. Will travel anywhere North or South America. Details and references by request. Address E. Y., Apt. 1, 83 Park Ave., Paterson, N. J.

POSITION WANTED—Boss Dyer desires position. Over thirteen (13) years experience in leading Eastern finishing plants, dyeing plain dyes and grounds for discharge printing. Familiar with all types of dyes on cotton, rayon and celanese. Technical training. New England preferred. Address Box No. 939, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.